

RG 104 - Entry 23

Box 1, Vol 3 July 6, 1909 - April 9, 1924

1906 - 1940

Copies of Letters and Reports sent to the
Superintendent of the Denver Mint by the
Melter & Refiner's Department



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(TRADE-MARK REGISTERED.)

This Parchment Paper is **MUCH STRONGER** and shows a **CLEARER COPY** than any other ever made for the purpose. The ink is **LESS LIABLE TO SPREAD** and the paper can be written upon with a pen.

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150 M 2-06

M. & R.'s Office
U.S. MINT, D. C. VER

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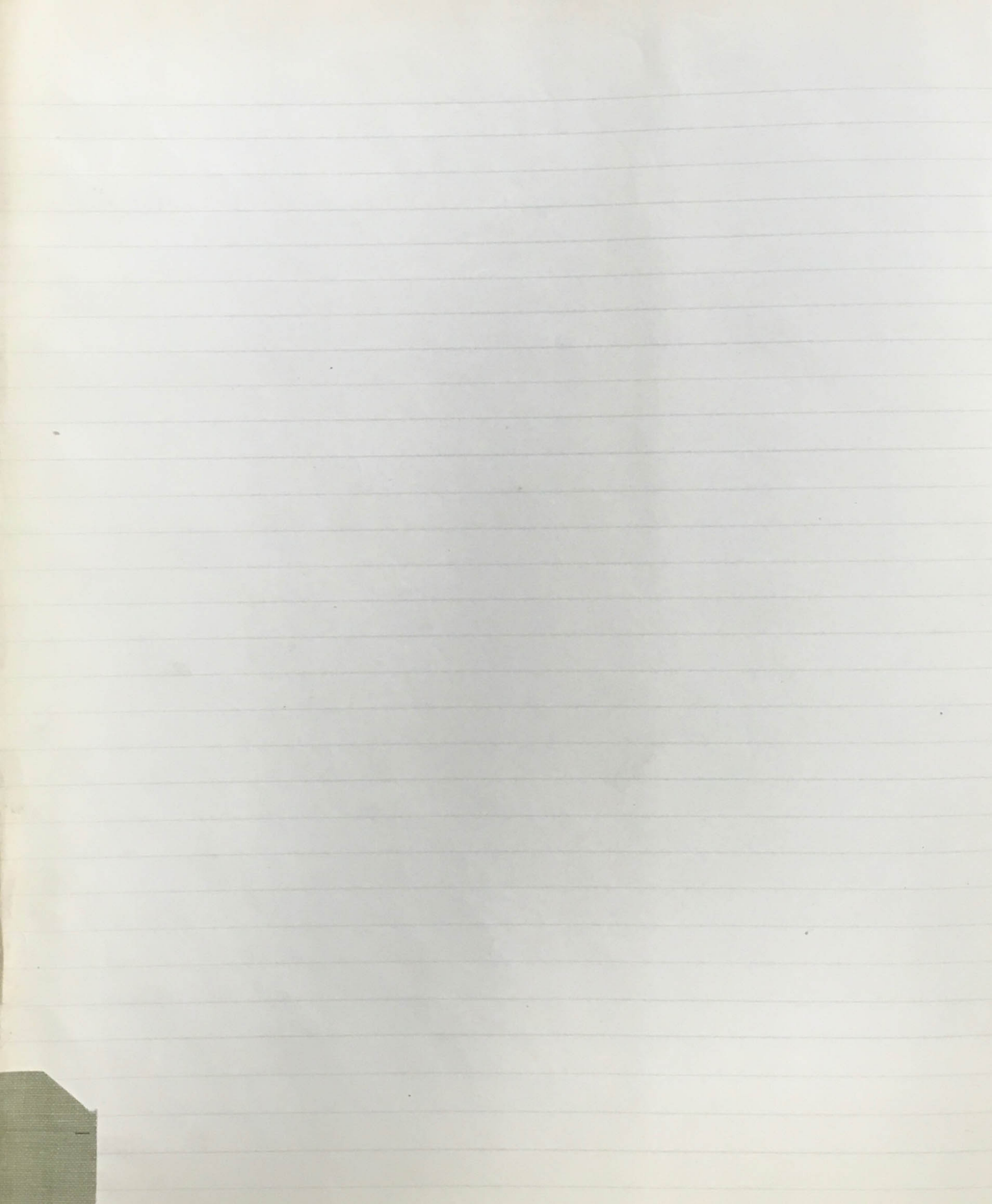
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MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

July 6, 1909.

Hon. Frankl. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

During the last visit of Hon. Frank A. Leach, Director of the Mint, to our institution, he requested us to ascertain the temperature at which we poured our ingot melts and inform him of our determination in the matter. We have concluded a series of pyrometric tests, and I now have the honor of reporting results.

In each case the pyrometer tube was placed in the metal at the time when the foreman of the melting room was satisfied that the metal was sufficiently fluid for pouring.

On standard silver, after stirring, the temperature of the metal was 90 deg. C., at which point we commenced pouring into ingots. During the pouring it increased quite rapidly to 925 deg., and then slower until a maximum of 930 deg. was reached.

On standard gold the temperature was 1010 deg. C., when the melter began pouring, and increased rapidly until the melt had half poured, reaching 1055 deg. The last half of the melt was poured between 1055 and 1060 deg. C.

The test on fine gold was made during the pouring of the first half of the melt only. The melt was poured into ingots, and the melter tried to pour at 1060 deg. C., but found the metal too cool. The temperature was then increased to 1070 deg., at which point

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MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Supt. 2

metal was quite fluid and poured freely.

The results we have obtained by pouring our ingots at such a low temperature have been much more satisfactory than by any other method, particularly in the matter of ductility. To test the latter point, we made many tests on silver ingots before reaching a final determination in the matter, in this way: When the melt had reached a temperature of about 910 deg. C., we would thoroughly stir the melt and pour an ingot, and then increase the temperature according to the practice obtaining at that time, to a very high point for the regular pouring, and we would then take another ingot from the same melt for comparison. And upon rolling, the ingots poured at the low temperature were always more ductile and smoother on the edges than those poured from the same melt at a high temperature.

The percentage of good blanks cut in the Coining department during the fiscal year just ended was, gold, 74.37; silver, 72.36; and we know the greater ductility of the ingots caused by pouring at a low temperature had a bearing on those results. In fact, at the request of the Coiner on several occasions we poured melts at a high temperature, and delivered them in the regular order of business without disclosing the identity of the melts, other than to state that they were included within certain numbers. The percentage of blanks cut from those melts was carefully determined, from which it was ascertained that the largest percentage of good blanks

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Supt. B

In every test was obtained from the melts poured at a low temperature.

Respectfully submitted,

Joe Wilson
Melter and Refiner.

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MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 1909.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In the month of June, the Ingot Melting room made 30 sweats,
6 experimental bar melts, and 3 mass melts for the coining depart-
ment, the expense thereof being as follows:

Crucibles, covers, and rings	\$28.92
Borax, soda, and nitre	61.47
Supplies	6.05
Fuel	20.40
Labor	16.68
Power	17.45

Total

140.97

Respectfully submitted,

Joseph M. Downer
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER
MELTER AND REFINER'S DEPARTMENT

August 16, 1909.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In compliance with your request of the 11th inst., I have the honor to report as follows upon the re-assays of copper base settlement bullion of fiscal year, 1909:

The samples were quarter-inch drillings, one through each of the 43 ingots comprising Melt No. 1. In the other five melts, six holes from top and the same number from bottom of each bar, fully to the center from each side, furnishing a good sample of twenty ounces for each melt.

It was found necessary to report the gold fineness on the average of a half dozen or more assays on each melt, which assays varied as much as five points; the silver assays giving good agreements.

The melts which had been subjected to a thorough preliminary refining, previous to settlement, in the reverberatory furnace (Melts Nos. 1 and 2), and containing not more than 2% of base metals other than copper, gave good results, and agree very closely with the gold fineness as originally reported. The melts showing the greatest variation from original assays, and between the several assays, contain upwards of 30% of base metals other than copper.

MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT.

Superintendent - 3

Melts Nos. 3 and 4 were remelted and assayed from granulations, giving less satisfactory results than from the drillings. These latter melts contain a large amount of iron sulphide, forming a matte of a half inch thickness on the bars, and which is also unequally distributed throughout the granulated sample, precluding the possibility of an exact assay for gold.

In my judgment, the best that can be expected from bullion of this character, upon a re-assay as above, is a fair approximation.

The re-sampling and re-assay of the 18,117.00 gross ozs. shows a gain of 37.676 standard ozs. gold, and 261.26 standard ozs. silver; the latter having been entirely disregarded in original report.

Report on form 773 herewith.

Very respectfully,

J. H. Hetchick
Acting Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT

August 27, 1909.

Mr. Hubert D. Coleman,
Melter and Refiner, U. S. Mint,
New Orleans, La.

My dear Sir:

An answer to your communication of the 6th inst. was delayed on account of my absence in the western part of the state.

In all our pyrometric tests we use the "Le Chatelier" pyrometer; it gives satisfactory results and meets all our requirements.

In 1908 we made a continuous run on 3,556,313.56 ozs. of silver without a remelt. During the fiscal year 1909 we made 2,804,276.55 ozs. of silver ingots and did not have a remelt, and we made 2,793,704.47 ozs. of gold ingots during the same time and had only one remelt, and that was the last melt of the year.

During those years we made all our ingots by what we call the cold-pouring method, except occasional melts poured hot at the request of the Coiner for experimental purposes, which experiments demonstrated that the Coiner cut a larger percentage of good blanks from the cold-poured melts, in every instance. From these practical results, as well as on many experiments, we are convinced that we get a more ductile ingot by cold-pouring, as well as a more homogeneous one; and we are strongly of the opinion that our operating wastage is reduced as well.

MINISTY OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Coleman - 2

Should there be any details regarding which you desire information from our standpoint, please let us hear from you.

Sincerely yours,

Joel W. Milson
Melter and Refiner.

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MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

September 15, 1909.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In response to that portion of the Director's letter of September 11, 1909, relating to this department, I have the honor to report that the department of the Melter and Refiner of the Denver Mint, during the fiscal year ended June 30, 1909, operated upon bullion as follows:

Items	Gold	Silver
	Standard ozs.	Standard ozs.
Ingots.....	2,866,333.080	2,862,371.81
Refinery.....	2,042,995.755	1,839,604.62
Merchant bars.....	731.955	533.78
Total.....	4,910,060.790	4,702,510.21

Respectfully,

Joseph Milam
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 5, 1909.

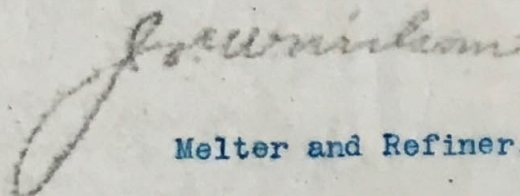
Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank books for the use of the Melter and Refiner's Department during the present fiscal year. None of these will be required before January 1, 1910.

4 Form No. 963 Melter and Refiner's Register of Deposits

Respectfully,



Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 12, 1909.

Mr. Frederic P. Dewey,
Assayer, Mint Bureau,
Washington, D. C.

My dear Mr. Dewey:

It affords me much pleasure to respond to your request of the 7th inst., by enclosing herewith a three-page list of all gold ingot melts for over three years that did not contain mint fine gold. While the facts do not seem to accord with your recollection of the matter, yet I trust it will be of some assistance along the lines on which you are working.

With kindest regards, I remain,

Sincerely yours,

Foran Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

The following list sets forth all of the gold melts made in the Denver Mint from February 20, 1906, to June 30, 1909, from clippings alone or clippings with condemned coin and blanks; showing the fiscal year, number, composition, amount of copper added, weight, and fineness of each melt. No fine gold was added to any melt. Where condemned coin or blanks, or both, are added to the clippings, the amount of each is roughly approximated. No melts of this character made in fiscal year 1909.

No. of Melt	Composition	Copper Added	Weight	Fineness
'06				
35	Clips		5294.90	.8999
36	"		5717.67	.8999
'07				
1	C.C. & Clips	1/2 oz.	4941.23	.8997 C.C. 2/5; C.B. 2/5; Clips 1/5
2	do	do	4808.13	.8997 do
71	do	1/4 oz.	6140.82	.8999 C.C. 1/2; C.B. 1/4; Clips 1/4
72	do	do	5882.51	.8998 do
73	do	do	7269.45	.8998 do
266	Clips	1/2 oz.	6431.67	.8998
7	"	do	6270.60	.8998
8	"	do	6327.76	.8998
9	"	do	5030.78	.8997
270	"	do	6428.87	.8998
1	"	do	6158.29	.8998
2	"	do	6529.81	.8998
3	"	do	6157.05	.8998
4	"		6443.34	.8998
5	"		6199.06	.8997
6	"		6649.40	.8998
7	"		6057.88	.8997
8	Cond. Blanks		6426.32	.8997 Con'd Blanks
9	"		6359.66	.8998 do
280	"		6519.10	.8997 do
1	"		6510.44	.8997 do
306	C.C., Blanks, Clips		6597.10	.8998 C.C. 1/20; C.B. 7/20; Clip 3/5
7	"		5949.02	.8998 do

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

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No. of Melt	Composition	Copper Added	Weight	Fineness
308	C.C., Blanks, Clips		6539.02	.8997 C.C. 1/20; C.B. 7/20; Cl. 3/5
9	"		6029.58	.8997 do
'08				
1	Clips		6319.35	.8998
2	"		6034.23	.8997
3	"		6464.02	.8997
4	"		5830.02	.8998
5	"		6183.15	.8998
6	"		5861.83	.8998
7	"		6204.67	.8999
8	"		5918.59	.8998
79	Blanks, Clips	1/4 oz.	6097.83	.900 C.B. 3/4; Clips 1/4
80	"	do	6044.45	.900 do
1	"	1/2 oz.	6035.03	.8999 do
2	"	do	6226.32	.8999 do
111	"	3/4 oz.	6078.42	.900 C.B. 2/3; Clips 1/3
2	"	do	6029.15	.8998 do
3	"	do	6068.54	.8998 do
4	"	do	6014.43	.900 do
131	"	do	6028.39	.8999 C.B. 3/4; Clips 1/4
2	"	do	6095.95	.900 do
3	"	do	6046.58	.9002 do
4	"	do	6086.18	.900 do
189	"	1 oz.	6062.56	.8998 C.B. 2/3; Clips 1/3
190	"	do	6064.80	.8999 do
1	"	do	6022.96	.8999 do
2	"	do	5979.45	.8999 do
3	"	do	6081.46	.8999 C.C. 1/3; C.B. 1/3; Clips 1/3
4	"	do	6014.83	.8999 do
5	"	do	6031.28	.8999 do
6	"	dp	5969.19	.8999 do
7	"	do	5989.27	.8998 do
8	"	do	6204.53	.8997 do
223	C.C. & Blanks	3/4 oz.	6255.42	.8999 C.C. 1/3; Clips 2/3
4	"	do	6093.51	.8999 do
5	"	do	6231.60	.900 do
6	"	do	6055.52	.900 do
7	"	do	6151.28	.900 do
8	"	do	5475.83	.8999 do
281	C.B. & Clips	do	6093.12	.8999 C.B. 2/3; Clips 1/3
2	"	do	6043.07	.8998 do
3	"	do	6101.53	.8999 do
4	"	do	6048.84	.8999 do

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

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No. of Melt	Composition	Copper Added	Weight	Fineness	
285	C.B. & Clips	3/4 oz.	6054.91	.8998	C.B. 2/3; Clips 1/3
306	Blanks, Clips	do	6071.31	.8999	C.B. and Clips about equal
7	"	do	6050.00	.900	do
8	"	do	6058.90	.900	do
9	"	do	6048.52	.8999	do
310	"	do	6067.34	.8999	do
358	C.C. & Blanks	1 oz.	6071.78	.8999	C.C. 1/3; Blanks 2/3
9	"	do	6060.30	.900	do
360	"	do	6023.77	.8999	do
372	Blanks, Clips	do	6099.65	.8999	Blanks 4/5; Clips 1/5
3	"	do	6087.14	.8999	do
4	"	do	6099.83	.900	do
5	"	do	6103.50	.8999	do

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 7, 1909.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The original equipment of our refinery includes a lead pipe eight inches in diameter and about twenty-eight feet in length, placed horizontally above the gold cells, with which four vertical pipes of the same diameter and material were connected from the hoods of the gold cells, for the purpose of carrying away the acid fumes. The original construction was of such a nature that the long horizontal pipe could not be cleaned, as there was no provision made for getting into it, and all the vertical connections were firmly secured and burned together; and such conditions did not change from the time we first commenced operations in the refinery until our shut-down last July.

Of course we have known for a long time that said horizontal pipe was wholly inadequate for the purposes intended, and, so during our recent shut-down, we took it out and substituted one sixteen inches in diameter, with provisions for cleaning. We carefully cleaned the horizontal pipe taken down, and obtained therefrom quite a little fine dust, and, upon melting the same, succeeded in getting 58.504 standard ounces of gold.

I report the matter at this time, because it is not a gain due to this year's operations, neither does it seem possible to

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

distribute it to the years already settled for. Unless otherwise directed, the said 58.504 standard ounces of gold will be included in the refinery ^{account} ~~samples~~ at next settlement, but the Melter and Refiner's report made at that time will fully show its source.

Respectfully,

Joseph W. Milson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

December 8, 1909.

Gen. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I desire to present the following statement in response to your request for "four samples of an ounce each representing four lots of Refinery silver that have been passed by the Assayer as free from gold."

Upon starting up our Refinery last month, we put in use a new propeller or agitator in the silver cells, with a speed of 600 revolutions, and all the melts of fine silver showed a trace of gold, the highest being .00005. We then made a new drive pulley and reduced the speed of the propellers to 366 revolutions, and thereby reduced the trace of gold to .000023; and on yesterday I made a requisition for a still larger drive pulley that will reduce the speed of the propellers to 250, which we believe will enable us to produce fine silver free from any trace of gold; and if it does not, we will take such ^{other} steps as may be necessary to accomplish the desired end.

At the present time we have not got any refinery silver that has been passed by the Assayer as free from gold.

Respectfully,

Joseph Milburn
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

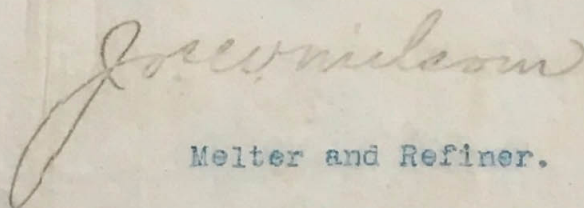
January 27, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Considerable of the nitric acid received from the Denver Fire Clay Company is not up to standard; it contains either sulphuric acid or some other soluble sulphate which is very detrimental to our work in the cells. Will you please cause such steps to be taken as may be necessary to procure for us the proper quality of nitric acid?

Respectfully,

A handwritten signature in cursive script, appearing to read "Joseph Wilson".

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER
MELTER AND REFINER'S DEPARTMENT

February 5, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Touching your inquiry, of comparison between the buckskin gloves and horsehide mitts from Philadelphia with those heretofore purchased in Denver, permit me to present the following:

The Refinery has used the Philadelphia product only part of the month of January, and that with an intermingling of the old Denver product; and the Ingot room has used only one pair of the Philadelphia gloves and none of the mitts, so it is impossible at this time to make a comparison that would be of any value as to durability.

The Philadelphia glove is a little heavier than the Denver glove, and consequently not quite as pliable; but the Refinery employees using the new glove do not consider that feature any objection in their work; however, in the Ingot room, the heavy seam on the front and back of the thumb seems undesirable, as they make the thumb of the glove quite stiff, and its constant use irritates the back of the thumb. The Denver glove has only one seam on the thumb and that is on the inside and cannot cause friction. The use of the new glove in the Ingot room has been so limited, however, that it would be unfair to consider as gen-

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT

Superintendent -- 2

eral an objection based upon the use of only one pair of gloves.

I shall be pleased to report further after we have had an opportunity to test the product as to durability.

Respectfully,

Joe W. Wilson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT

February 10, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering your letter of the 10th ult., I am in full agreement with the Director of the Mint and yourself "that the officials of the several Mints could obtain much information of profit through an occasional exchange of ideas," as in that manner only can any Mint obtain exact and authoritative knowledge of the details of the various operations in other like institutions.

I would respectfully suggest that the officials of all the Mints be called upon, from time to time, for the details of different operations in their respective departments, eventually covering all lines of work; the distribution of copies of the various reports to the Mints would then enable each of us to become advised as to the methods obtaining elsewhere; and when the processes differed, we could experiment sufficiently to determine which is the best and least expensive.

To illustrate the suggestion, I submit the following report on our method of receiving and treating gold and silver bullion in the Denver Mint:

All gold bullion is divided into two classes, viz: the first, comprising gold which is sufficiently fine to be alloyed either with gold of higher or lower fineness, so as to make melts whose

MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT.

Superintendent -

finenesses are .880 or over, in gold, and the balance silver and base, preferably in equal parts; and the second class of gold which is of too low a fineness to be used in this manner, and must therefore be treated in the silver cells.

The melts of the first class are made up in lots of about 6,000 ounces, weighed and checked by the Assistant Melter and Refiner and the Foreman of the Refinery, and a receipt given for the number of bars and weight of bullion. They are then taken to the Refinery melting room and melted, thoroughly stirred, and poured into anodes, 3-1/4"x8"x1/4", each weighing about 60 ounces. After the melter has dipped all of the metal possible, the crucible is drawn and the remainder of metal is poured. This is done in order that no metal will be mixed with that of a following melt. It also enables us to check the actual fineness of the melts with the calculated fineness, for which purpose two granulation samples are taken for assay.

The anodes from these melts are then refined by the Wohlwill process which at the present time at this Mint differs from the original process, in the use of sodium chloride to take the place of a portion of the hydrochloric acid which it was necessary to have in the electrolyte. In starting the cells with this system, we found that, with anodes containing 70 to 90 parts silver with 30 to 60 parts base, it was necessary to have from 10% to 14% free hydrochloric acid present. We are now using from 2-1/2% to 3-1/2% free acid with 4% to 6% sodium chloride. In the month of December last, we used about 2,000 pounds less of hydrochloric acid than

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT.

Superintendent - 3

in any other month last year, with the same approximate output, replacing this amount of acid with about 500 pounds of sodium chloride. The average fineness of refined gold for December was .9996.

The gold slimes which are composed of 45% metallic gold and 55% silver chloride are thoroughly washed and pressed into cakes by means of a hydraulic press. They are then melted at a low temperature; the silver chloride melting first, is skimmed from the surface of the melt and is poured into a shallow pan where it is stirred continually until it sets. The condition of the chloride now very much resembles granulated lead; and about 75% of it will pass through a 20-mesh sieve, the remainder being ground in a chilian mill. This chloride is then reduced to metallic silver with granulated zinc in the usual way.

After the skimming operation, the heat is increased on the gold, and the last traces of chloride removed with bone ash. The gold, the fineness of which is from .260 to .980, with from 20 to 30 parts silver, is then poured into anodes. These anodes are used for making electrolyte for the gold cells.

Gold of the second class, or that which is treated in the silver cells, is alloyed with silver and made into melts weighing about 5,000 ounces, composed of from 360 to 400 parts gold and from 20 to 130 parts base, the balance being silver. These melts are checked, weighed, and receipted for in the usual manner, and are then taken to the Refinery melting room where they are melted.

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and poured into ingots $18 \times 12 - 3/4 \times 3/8$ ", weighing about 110 ounces. Two granulation samples are taken for assay. The crucible is drawn after each melt in order to prevent any metal from being mixed with the following melt.

These melts are then placed on separate shelves in the Refinery vault. As they are needed for the cells, melts of similar or nearly similar fineness are selected for the same cell, which will contain 55 anodes and 70 cathodes. The electrolyte used is silver nitrate, containing from 2% to 3% silver and $1 - 1/2\%$ to $2 - 1/2\%$ free nitric acid. The electrolyte is heated by means of steam coils upon which the cells are placed; the average temperature of the solution in the cells being about 40 degrees Centigrade.

The current density at the anode is about 14 amperes and at the cathode, 13.5 amperes per square foot. The anodes remain in the cells from $3 - 1/2$ to $4 - 1/2$ days, when they are removed, broken into small pieces, and melted.

If melted alone, the metal would now assay from .910 to .950 gold, with 5 to 15 parts base, mostly lead, and the balance silver. We have, however, found it advantageous to add to the melt a base bar whose fineness is .950 or over, the balance being base, mostly copper, thereby obtaining melts which will average .906 gold, .067 silver, and .027 base. These melts are treated in the gold cells and give very little trouble.

For the past three years our methods of refining have been

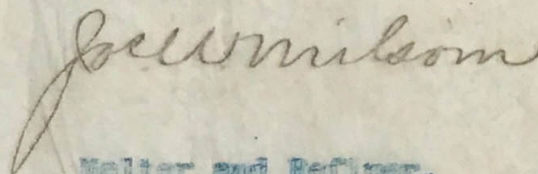
MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT.

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exclusively electrolytic, as we have not in that time used any of the acid boiling processes.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "J. C. Wilson". The signature is written in dark ink and is positioned above the typed name "Melter and Refiner."

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 19, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The official bond of Josiah M. Hetrich, dated February 21, 1906, as foreman of the make-up room, is about to expire; and I respectfully suggest that the new bond contain his present title, Assistant Melter and Refiner, bond to be in the same amount as formerly, \$10,000.00.

Respectfully,

Josiah M. Hetrich
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 21, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering the letter of the Director, under date of February 17th, regarding re-deposit No. 418 (Salt Lake No. 173), I transmit herewith 2.26 ozs. boring samples from said bar.

Standard ounces gold, 2.219; no silver.

Respectfully,

Joseph Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 21, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to the Director's letter of February 17th, referred to this department, with reference to refined silver purchased from outside refineries, I respectfully report that we have none of it on hand.

Respectfully,

John Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 10, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

This department has treated the sweeps from the Deposit melting room for the six months ending December 31, 1909, and consisting of residuary fluxes, crucibles, and fire brick, with the following results:

We obtained a bar of metal weighing 207.00 gross ounces, assaying .442 gold, .307-1/2 silver, and containing standard ounces of gold, 101.66, and silver, 70.72, which has been delivered to the General department and receipt taken therefor.

We obtained 9,118 lbs. of tailings, assaying, gold, 4.85 per ton, silver 10.81 per ton, and moisture 11%, leaving a net product of 8,116 lbs., containing standard ounces of gold, 21.86, and silver, 48.74. The tailings are now properly sacked and stored in the Sweeps cellar awaiting your pleasure regarding their disposal.

The cost of the Sweeps cellar operations on said sweeps was \$144.94.

Respectfully submitted,

J. J. McCormick
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

March 21, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering the Director's letter of the 17th inst., regarding the cost reports of this department for the months of January and February, permit me to present the following, which will clearly show the reason for the discrepancy referred to:

The Refinery was closed down the first four months of the present fiscal year, and the expense chargeable to the Refinery for said four months amounted to \$4,525.52.

Having no precedent to follow, and only the general instruction that shut-down expenses should be apportioned to coinage charges of the months of actual coinage operations in each year, I added one-eighth of the shut-down expense, to wit, \$565.68, to the actual costs for each of the months of November and December; but failing to find any precedent for such charge in the cost reports of other Mints, and the Chief Clerk informing me that he carried each month its proportionate share of said shut-down expense against the general coinage costs, and believing that the addition of said \$565.68 to the Refinery costs each month would certainly not permit a fair showing of the actual cost per ounce of our work, I deducted the said sums so added (\$1131.38) from the total costs for the months of November and December, and

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

started out January 1st with the new total of costs, \$9,615.22, which was the actual amount of money expended in said two months for operating upon "crude" ounces, 635,580.29; and "operated on", 919,458.92. By using the new total of actual cost for the first two operating months, the cost reports for January and February will be found correct.

Respectfully,

Joseph Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT,

March 24, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

We, the undersigned, have carefully gone over and discussed the matters set forth in the communication of the Director, bearing date the 18th inst., relating to the amendment of Article 2, Instructions and Regulations, and a revised table of charges and correspondence relating thereto, and hereby present the results of our observation:

Art. 1, sec. 3, Instructions and Regulations, fixes the character of bullion deposits, that is, as gold bullion or silver bullion, by the fineness of the metals; and the proposed amendment to Article 2, as well as the new table of charges, recognizes the designations made thereunder.

All references hereinafter made, unless otherwise specified, will be to the amended Article 2 and the revised table of charges, as the same were submitted to us.

Art. 2. - Reporting on Bullion.

"Sec. 1. All deposits of gold bullion at the Mints and Assay offices of the United States shall be reported by the Assayer to the quarter-thousandth."

"Sec. 3. All deposits of silver bullion at the Mints and Assay offices of the United States shall be reported by the

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Assayer to the half-thousandth."

The language used seems to make it necessary to report the gold and silver in gold bullion, each to the quarter-thousandth, and the silver and gold in silver bullion each to the half-thousandth.

"Fine gold bars" and "gold bars of standard fineness" are referred to in sec. 2, and frequently elsewhere; and we believe there should be an authoritative definition of these terms set out in the Instructions and Regulations. To cite an instance showing the necessity: If "standard fineness" as referred to in said sec. 2 means .900 fine, then under said section a gold ingot, .8999 fine, could not be reported to the one-tenth of a point, as the said section says "standard fineness and upward." For the foregoing reasons we respectfully suggest the following changes in the amendment of Art. 2:

Sec. 1. All bullion deposits of gold or silver at the Mints and Assay offices of the United States, except the classes of deposits enumerated in the following section, shall be reported by the Assayer as follows: Gold to the quarter-thousandth, and silver to the half-thousandth.

Sec. 2. The same as submitted to us.

Sec. 3. Bars containing nine hundred and ninety-two thousandths and upwards of gold shall be designated as "fine gold bars." Bars containing from eight hundred and ninety-nine to nine hundred and one thousandths, inclusive, of gold, shall be designated as

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

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Superintendent - 3

"gold bars of standard fineness;" and bars containing from eight hundred and ninety-seven to nine hundred and three thousandths, inclusive, of silver, shall be designated as "silver bars of standard fineness."

Sec. 4. The same as submitted to us.

Revised tables of charges:

Sec. 2. We think paragraphs 1 to 6, inclusive, are quite satisfactory. Under paragraph 7 we would suggest an increase in the charge where the copper exceeds two hundred thousandths, say, an additional half cent for each additional hundred thousandths of copper; because, as a matter of fact, we put everything through the Refinery--the high grade bars being used for the purpose of fining up the low grade bars, and making the resulting melts suitable for our cell work. Further, suppose a bar contains 300 parts gold and 700 base; under paragraph 3 of this section, it would take a charge of 8 cents per ounce, but paragraph 7 steps in with a charge of only 1/2 cent per ounce if the base be all good copper; and the latter fact can only be accurately determined by a chemical analysis which is expensive work, and when necessary should carry some method of compensation.

We heartily endorse that portion of this paragraph which says the silver contents in bullion when less than ten thousandths shall not be reported for the benefit of the depositor, because gold bullion containing less than ten thousandths of silver and all the balance of the alloy good copper, would, if the silver was reported,

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 4

take a charge of at least 4 cents per ounce; and therefore the depositor would be not only willing but very anxious to forego the small amount of silver for the purpose of obtaining a substantial reduction in charges under this paragraph. And, finally, the alloy in our mint fine gold is an actual loss of silver that the Melter and Refiner's department has no way of overcoming, but this small allowance would help some.

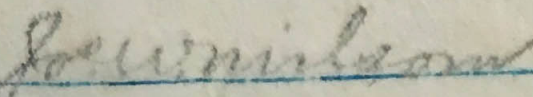
Sec. 3. Refining Silver.

Under this section a bar containing 15 parts gold, 980 silver, and 5 base would carry a charge of $4/10$ cent per ounce; while under section 2, p. 1, the same bar would require a charge of $3/4$ cent per ounce. This conflict would be obviated by inserting the words "free from gold" between the third and fourth words of said section, thus making it read, "upon silver bullion free from gold, assaying" etc.

Respectfully submitted,



Assayer.


Melter and Refiner.

See pp
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"gold bars of standard fineness;" and bars containing from eight hundred and ninety-seven to nine hundred and three thousandths, inclusive, of silver, shall be designated as "silver bars of standard fineness."

Sec. 4. The same as submitted to us.

Revised table of charges:

Sec. 2. Parting and refining bullion (rate per gross ounce):
Paragraphs 1, 2, and 3: We desire to reiterate our former carefully considered opinion that the additional base necessary for the added half cent charge should not be less than one hundred thousandths in each instance.

Paragraph 6. After very careful consideration of this paragraph, in connection with the amount of bullion of this class received, we are firmly convinced that the charge should be reduced from 4 cents to 3 cents per gross ounce.

Under paragraph 7, we would suggest an increase in the charge where the copper exceeds two hundred thousandths, say, an additional half cent for each additional hundred thousandths of copper; because, as a matter of fact, we put everything through the Refinery--the high grade bars being used for the purpose of fining up the low grade bars, and making the resulting melts suitable for our cell work. Further, suppose a bar contains 300 parts gold and 700 base; under paragraph 3 of this section, it would take a charge of 8 cents per ounce, but paragraph 7 steps in with a charge of only $1\frac{1}{2}$ cent per ounce if the base be all good copper;

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and the latter fact can only be accurately determined by a chemical analysis which is expensive work, and when necessary should carry some method of compensation.

We heartily endorse that portion of this paragraph which says the silver contents in bullion when less than ten thousandths shall not be reported for the benefit of the depositor, because gold bullion containing less than ten thousandths of silver and all the balance of the alloy good copper, would, if the silver was reported, take a charge of at least 4 cents per ounce; and therefore the depositor would be not only willing but very anxious to forego the small amount of silver for the purpose of obtaining a substantial reduction in charges under this paragraph. And, finally, the alloy in our mint fine gold is an actual loss of silver that the Melter and Refiner's department has no way of recovering, but this small allowance would help some.

Sec. 3. Refining Silver.

Under this section a bar containing 15 parts gold, 980 silver, and 5 base would carry a charge of $4/10$ cent per ounce; while under section 2, p. 1, the same bar would require a charge of $5/4$ cent per ounce. This conflict would be obviated by inserting the words "free from gold" between the third and fourth words of said section, thus making it read, "upon silver bullion free from gold, assaying" etc.

Respectfully submitted,

A. P. Hodgson
Assayer.

John Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 31, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank forms for the use of the Melter and Refiner's Department during the six months commencing July 1, 1910.

200	Form No. 722	Statement of operations
500	" " 929	Melts for parting

Respectfully,

Joseph Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER.
MELTER AND REFINER'S DEPARTMENT.

April 9, 1910.

Hon. F. M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Owing to the ill health of my family, and the necessity of at least a temporary removal to a lower altitude, I respectfully request that I be granted an indefinite leave of absence as helper in the Refinery, U. S. Mint, Denver, Colorado, commencing on the 19th day of April, 1910.

Very respectfully,

H. H. Wilson

Being fully advised in the premises, I recommend that the leave of absence be granted as requested.

Joe Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 12, 1910.

Mr. Herbert H. Winn,

Denver, Colo.

My dear Sir:

I am sorry that the health of your family necessitates your removal, at least temporarily, to a lower altitude, as it will deprive this department of an honest and faithful employee whose untiring energy along the line of duty has assisted much in the favorable results we have obtained. Your request for an indefinite leave of absence has been granted, and I desire to assure you that accompanying you to the Pacific coast will be the most earnest well wishes of every person employed in this department.

We hope that the change to a lower altitude may speedily restore your family to health and strength, and that will bring happiness and, we trust, unbounded prosperity as well. Should it ever be necessary for you to exhibit your record of over four years' service in this mint, you may refer to me.

Very truly yours,

John W. Milson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 14, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Mrs. Nilson has been quite sick for some time, and it is believed that the conditions at Glenwood Springs would be beneficial to her health; and, for the purpose of taking her there, I desire to be absent from the mint for about ten days, commencing on the 15th inst. During the absence, my official duties will be faithfully attended to by Mr. J. M. Hetrich, Assistant Melter and Refiner.

Respectfully,

Joe Nilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINERS DEPARTMENT,

April 29, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In January, 1909, we received 2208 copper ingots, weighing 39,667 pounds, none of which has been used; and we have other copper in the Make-up Room and to be received from the Refinery that will probably cover all we need for alloy purposes during the present fiscal year.

Respectfully,

John W. Milson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Methods of Melter and Refiner in Handling Deposit Melting Room

Sweeps at the Denver Mint.

To present this matter fully, I will first call attention to a brief history relating thereto, as taken from the reports of the Director of the Mint. Under the table headed "Earnings and Expenditures of the United States Mints and Assay Offices," appears an item designated "Deposit Melting room grains and sweepings," and the years and amounts thereof that I desire to refer to are as follows, to wit:

	Philadelphia	San Francisco	Denver
1907	\$1343.83	\$567.55	\$5262.07
1908	2554.06	872.43	5970.91
1909	1834.25	1543.11	1063.96

In the years designated, Philadelphia and San Francisco each received in deposits much more bullion than Denver; and the great discrepancy in the above figures is accounted for by the fact that in the years 1907 and 1908, and all previous years, the Melter and Refiner at the Denver Mint delivered to the Superintendent all metal extracted from Deposit melting room sweeps; but in 1909, followed the practice obtaining in the other mints, with the result that the Melter and Refiner's Department had a surplus that year of over nine hundred ounces of gold, and nearly one-half of that surplus was obtained from Deposit melting room sources.

Our Sweeps cellar was closed from July 1st to December 31st,

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFNER'S DEPARTMENT,

D.M.R.Sweeps - Methods - 2

and during that time we accumulated a large quantity of sweeps from the Deposit Melting room; and as soon as we started up in January, our Sweeps cellar work commenced on those sweeps, from which we obtained in metal 101.660 ozs. gold and 70.72 ozs. silver, and in tailings, 21.865 ounces gold, and 48.74 ozs. silver, making a total of 123.525 ozs. gold and 119.46 ozs. silver, obtained from six months' accumulation of Deposit Melting room sweeps, and the amount of bullion operated upon during that time by the Deposit Melting room was of a value of approximately \$7,677,946.00.

Under our interpretation of the Rules and Regulations, we did not believe that this recovery from Deposit Melting room sweeps should inure to the benefit of the M. & R. department, and so it was returned to the Superintendent, who treated it as a Deposit Melting room grain bar, by forwarding to the Treasury a C/D for the full value thereof. On April 5th, the action of the Superintendent in the matter was approved by the Bureau, and general instructions issued accordingly. So the record shows that the M. & R. of the Denver mint, during all the time this mint has been operating, received the product of Deposit Melting room sweeps for one year only (1909, fiscal).

In our sweeps cellar work, we always treat the various lots of sweeps separately, so that a reference to our records will show the source of each lot, the time it was operated upon, the amount of metal recovered, the amount of tailings, and their assay value.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINERS DEPARTMENT,

D.M.R. Sweeps - Methods - 3

And, of course, the tailings are sacked separately, and the sacks marked so that each lot is treated separately by the smelter, and we have no trouble whatever in giving the proper credit, and as well placing the smelter charges where they belong.

In treating the Deposit Melting room sweeps, we account for and turn over to the Superintendent everything obtained, which of course includes the metal recovered from old crucibles, stirrers, and furnace brick, as well as the resulting tailings. The tailings are not specifically referred to in the recent instructions of the Bureau, but are undoubtedly included in the general statement that, "it was certainly meant to cover all bullion recovered from the Deposit Melting room," because any other construction would defeat the very object of the instructions, and permit the Melter and Refiner to get bullion to which he has neither moral or legal right.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 11, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In the Sweeps cellar treatment of 11,013 lbs., gross weight,
of sweeps from the Deadwood Assay Office, the following expenses
were incurred, towit:

Labor, E.S. Smith	14	das.	7	hrs.	@	\$4.50	\$66.94
" J.A. Lindhardt	3	"	1	"	"	3.50	10.94
" R.C. Morrison	0	"	2	"	"	5.00	1.25
" M. Howard	0	"	1	"	"	3.50	.44

Total labor \$79.57

Gen'l Dept. Charges for Power	\$42.77	
" " " Light & Vent.	7.23	
" " " Repairs	6.05	
" " " Inciden'ls	.46	56.51

And supplies consisting of

2-1/4 sq. ft. 30 mesh screen	\$0.58	
3 lbs. quicksilver	1.96	
1 No. 80 crucible	3.45	
1 dipping cup	.45	
1 - 8" stirrer	.28	
15 lbs. borax	1.56	
25 " soda	.55	
2 " nitre	.14	
40 gals. distillate, for fuel	2.40	11.37
		<u>67.88</u>
		67.88

Total \$147.45

Respectfully submitted,

John Milburn
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER.
MELTER AND REFINER'S DEPARTMENT.

June 7, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The report of the Assayer of the Bureau of the Mint, dated March 13, 1910, upon the subject of reporting gold in Dore bullion to the quarter-thousandth, has been carefully considered by the undersigned; and, responding to the request of the Director in his communication of the 27th inst., that you obtain the opinions of the Assayer and Melter and Refiner regarding the same, we present the following:

In reporting gold in Dore bullion to the quarter thousandth, it is very necessary that the individual assay results on the same sample or bar should agree within very close limits; and if the small amount of gold in high grade silver bullion segregates to any extent, or if the bullion is not homogeneous, the assay results from that particular bullion will agree proportionately to the segregation or homogeneity of the bullion. If no segregation takes place and the bullion is homogeneous and there still exists a difference in the individual assay results, then that difference must be due to defective methods in assaying, and the methods should then be modified to give a closer agreement on the results obtained. But, if the methods now in

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

use cannot be changed sufficiently to warrant a very close agreement on this class of bullion, we see no reason why it should be reported to the quarter-thousandth; except that, in striking an average of a number of assays, the final average could be given to the nearest quarter-thousandth just as well as to the nearest half-thousandth; and this final result may, on the whole, be somewhat nearer the true fineness of the bullion than if it were reported to the half-thousandth.

It appears from said report that the methods employed in assaying this class of bullion were at fault, as the results on the same sample of bullion from the different institutions do not agree; nor do the same methods applied at different times on the same sample give the same results. And until some method can be devised whereby there can be a closer agreement on this class of bullion, the results will remain in doubt up to a certain limit. We have at this time no suggestions to offer as to changing the methods of assaying in the different laboratories.

Respectfully,

A. P. Hodgson
Assayer.

J. W. Milson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 9, 1910.

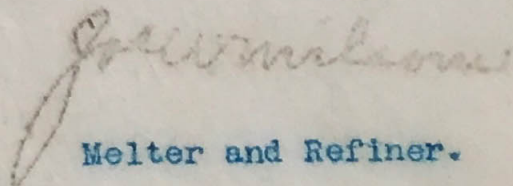
Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The Director's communication of the 27th ult., and the Bureau Assayer's report of March 12th submitted to me on the 6th inst. have been carefully considered, and in response thereto I respectfully present the following:

The direct interest of this department centers in the proposition of receiving the full amount of metal charged; and we want no more. If the gold contents of Dore bullion can be safely determined to the quarter-thousandths, I am in favor of so reporting it.

Respectfully,


Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 15, 1910.

To Employees of the Refinery,

U. S. Mint, Denver, Colorado.

You are hereby notified that the Refinery will not resume operations before August 1st, and your vacation is therefore extended to include all of the month of July.

By order of the Superintendent.

John W. Wilson

Melter and Refiner.

*Mailed to each employ. in Refinery
except Lundin, Back & Whetstone & Co.
J.W.*

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 27th, 1900.

Hon. J. M. Downer

Supt. U. S. Mint - Denver, Colo.

Sir,

Answering the Director's letter of July 20th, relative to copy of statement showing source of surplus in M. & R. dept.:-
No detailed statement was made other than that incorporated in form 900, the annual report, to wit:

Amount of M. & R. surplus, obtained from Refinery, Ingot room, Assayer, Settling well & grains, Au. 306.439, Ag. 1024.15
Assayer's surplus of Au. 41,532 was obtained from cupelling grains and swing of needle weighing clips.

Refinery surplus of Au. 541.858, Ag. 456.22, was obtained from fractional gains in weight and unreported fractions of assays.
Ingot room surplus of Ag. 389.81, was obtained from old furnaces and ingot room sweats, principally the former.

Respectfully

Jo. H. Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 9, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I desire permission to be absent from the Mint for fifteen days on account of vacation. And I hereby designate Mr. J. M. Hetrich to attend to my duties during such absence.

Respectfully,

J. M. Hetrich
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 30, 1910.

Hon. Frank M. Downer,
Superintendent U. S. Mint,
Denver.

Sir:

Answering, in so far as this department is concerned, the Director's letter of August 22:

The Melter and Refiner during the fiscal year 1910 operated upon standard ounces of gold and silver, as follows:

	Gold	Silver
In Refinery	1,411,433.731	1,471,908.34
In Ingot room	1,842,227.820	12,756.21
Totals	3,253,661.551	1,484,664.55

Respectfully,

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 31, 1910.

Hon. Frank M. Downer,

Superintendent, U. S. Mint,

Denver.

Sir:

I am so astonished at the contents of the letter dated August 16, 1910, written by Richard C. Morrison, formerly foreman of the Ingot melting room in the Denver Mint, that I want to say to you: That on August 5th, after you read to him in my presence letters to the Bureau and the answers thereto, he told you (he says) that if you dismissed him he would write a letter to the Department exposing lots of things about this Mint, and evidently tries to leave the impression that his threat to write a letter caused some kind of a change in your attitude; when, as a matter of fact, I remember very clearly that, when he spoke of writing a letter about showing up things, you instantly stopped him and said that, if that was the way he felt about the matter, he should go ahead and write his letter and that you had no desire to prevent his stating any facts regarding your administration; and then, seeing that his threat had not accomplished anything, he immediately and humbly apologized to both you and me for having, as he said, in a burst of passion made a statement that was wholly unwarranted by any facts. You then asked him if he knew of anything whatsoever that was not right in this Mint, and he positive-

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

ly assured you that he did not; and, later, in my office, I pressed him for his reason for making the threat referred to, and he assured me that it had positively no foundation in fact, that it was said in the heat of passion, and he hoped I would try and forget it.

On August 6th, I asked Mr. Morrison if he had answered your letter of the day previous; he informed me that he had it written in pencil and would bring it in and show it to me. We discussed the contents, and, as to the paragraph cut out, I simply made the observation that it was perhaps immaterial because, if the work was done under my direction (as he had previously stated), it was a matter of course that I knew of the wastage; and he then told me to cut it out and I did so.

On page 4 he makes a number of statements which have some foundation in various conversations I had with him, but most of them have been misconstrued and twisted out of their true intent to favor himself. To illustrate, he says I told him I did not see my way clear to write him a letter as "the superintendent might not like him to do so." The quotation marks are his and are wholly untrue, as I remember that matter very clearly. He never asked me to write him a letter, but he did say that there was one thing he was very sorry about and that was that I could not write him a letter, but that he knew it was not my custom to do so; and my reply was, "No, Dick; I can't see my way clear to do that." He says I told him I was sorry if I had to lose him, and I think that state-

UNITED STATES AT DENVER,
MINT OF THE UNITED STATES AT DENVER,

DEPARTMENT
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

ment is correct and was in a measure true when I made, but it is not now.

As some of the twenty-two specifications he lists against you are within the province of this department, I will also refer briefly to them:

Spec. 7. When the Eckfeldt-Dewey Commission was here in 1907, trying to ascertain the cause of the low fineness of a coin found by the Annual Assay Commission, the matter of putting ingot filings back into ingot melts was discussed; and while none of us believed that it had any appreciable effect on the resulting ingots, yet, at the suggestion of Mr. Dewey, we decided to hold the filings separate for a time, melt them, pour into bars, and send them through the

Refinery; and that method obtained until the first of the present calendar year. Our gold ingot melts contain about 6,000 standard ounces, and the filings average about two ounces to the melt; and during the two and one-half years that we refined them, the average fineness of the filings bars was over .897. So we concluded that we would save the loss in melting and the expense of refining and put them back into the ingot melts direct, as the slightly reduced fineness of two ounces in a melt of 6,000 did not and could not make any appreciable difference in the resulting ingots.

Spec. 11. Prior to the present calendar year, we used two men in operating the Sweeps cellar, one of whom we frequently worked elsewhere when necessary. But we found that one man could

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 4

do the work with a little assistance, and that is the way we are operating this year. Owing to the impossibility of sampling crucible and other sweeps sent to the sweeps cellar, before milling, it would be impossible to keep an accurate check on the bullion; but we are confident that it is accounted for with absolute honesty, and that all metal extracted either as amalgam or otherwise is properly returned.

Spec. 12. This is the "velvet" charge. The envelopes referred to are not all (and none should be) marked "velvet," as the contents are obtained from the sweepings of the stamping block. The full weight of the bars after melting is charged against this department, and when the weigh clerk stamps them before delivery, usually a few very minute grains become detached. But it would require considerable time for him to stop and clean the block after stamping each one, and so he cannot distribute the grains to each individual bar; but, after the bars for any particular transfer are all stamped, he sweeps the stamping block and puts the grains into an envelope and delivers it to us with the transfer, because it belongs to us and has already been charged against us in the weight of the bars. A few minutes ago I asked my assistant if he had any of these envelopes on hand, and he produced for me ten, eight marked "velvet," one marked (by myself) "Grs. 1st Seattle July 6=10," and the other marked "Grains from block." The ten weighed fifty-six hundredths ($56/100$) of an ounce, and represented ten separate trans-

REVENUE MINT OF THE UNITED STATES AT DENVER,

TEMPORARY MELTER AND REFINER'S DEPARTMENT,

Superintendent - STATE OF COLORADO

MELTER AND REFINER'S DEPARTMENT,

orders, and consisted largely of dust and dirt with some metal.
The latter part of this specification, viz, "and
that the method of handling bullion accounts in a measure for the
large yearly surplus in the refining operations" is absurd. We
treat the Refinery as a separate and distinct department, and use
the same care in accounting with it as with the General Department.
When we send bullion to the Refinery, we charge it with the book
weight, but enter on our record in red ink the actual scale weight;
and at the end of the year, at annual settlement, we always show
the fractional gains on weights of deposits; the same for the fiscal
year just closed (1910) being 13.788 standard ounces of gold ac-
quired from deposits sent to the Refinery containing 1,139,654.434
standard ounces. So that it is evident that your method of hand-
ling bullion cannot in any way affect the excess produced in the
Refinery.
In conclusion I desire to say, in all fairness to Mr. Morrison,
that his work as an ingot melter was very good, and his conduct as
foreman was of material assistance to me, as he always kept minute
and accurate accounts of everything connected with his work. But
the revelations of his character as evidenced by his letter of the
18th inst., and other information that has come to me within the
last few days, prompts me to make the statement that I was mis-
taken in my estimate of him, and I now recognize that his separa-

MINT OF THE UNITED STATES AT DENVER
MELTER AND REFINER'S DEPARTMENT

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 6

tion from the service was absolutely necessary.

Respectfully,

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 31, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Referring to the Director's letter of August 26, 1910:

The shut-down expense of the Melter and Refiner's department for the months of June and July was not kept separate from other expenses, but was charged against the operations, with the exception of the Refinery in July. The vacation expense, however, will probably cover the shut-down item, and is as follows:

	June	July
Refinery	\$123.66	\$1,474.45
Ingot	50.34	291.46
Totals	\$174.00	\$1,765.91

The total charged against the Refinery cost for July and to be distributed during the remaining eleven months of the year is \$2,106.73, which, of course, includes repairs, etc.

Respectfully,

John W. Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER
MELTER AND REFINER'S DEPARTMENT.

August 30, 1910.

Mr. Jos. W. Milsom,
Melter and Refiner, U. S. Mint,
Denver.

Sir:

I desire to call your attention to the conditions under which our present methods of Refining are being conducted, and the desirability of making necessary changes. In our present methods of refining gold and silver at this mint, the output is limited to about 150,000 ounces of gold per month. This is due to the fact that about 90% of all the gold received at this institution must be alloyed with silver and treated in the silver cells before it is fine enough to treat in the gold cells. At the present time we have eight silver cells in operation. It is impossible to increase this number on account of lack of space; the floor space in our Refinery being less than one-fourth that of either of the Refineries at the Philadelphia and San Francisco mints.

We now have two direct current generators, one for the silver and one for the gold system. In the event of either machine getting out of order, it is impossible to use the other machine for both systems, without greatly decreasing the output of gold and silver, on account of the small capacity of these generators.

During the months of April and May, 1910, I made some experiments on refining bullion containing varying amounts of gold and silver, by the application of the pulsating current. The results were quite satis-

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Wilson - 2

factory, and, upon investigation, I find that the deposits from all of the Assay Offices received at this Mint, and about 90% of our local deposits could be treated by this system.

This would mean less work in the handling and melting of the gold, a considerable reduction in the amount of acid used, and a smaller loss of gold in melting. The output of gold from the Refinery could be increased if necessary, and two or three silver cells would be sufficient to treat our silver and base deposits. The cost of refining this class of bullion, the average fineness of which is between 800 and 850 parts gold, would be decreased by this system.

I would therefore recommend that the motor generator set, specifications for which have been furnished, be purchased in order that this system may be applied to the operations in this Refinery.

Respectfully,

B. P. Wirth

Foreman of Refinery.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 7, 1910.

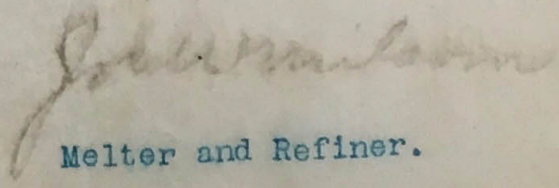
Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

After considerable discussion regarding our refining methods, I requested the Foreman of the Refinery to write me fully regarding any suggestions he desired to make along the line of bettering our working conditions. I received his letter on August 30th, and transmit the original herewith, together with the specifications for a motor generator set prepared by the Foreman of the Machinery department and the chief electrician.

I am very anxious to install this system in the Refinery, because I am convinced that it will materially better our methods, and as well make for economy in our operations. I therefore most earnestly recommend that the motor generator set as described in the said specifications be purchased, and that any initial steps necessary thereto be taken as soon as convenient.

Respectfully,


Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 8, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering that portion of the Director's letter of August 31st, relating to the Melter and Refiner's department, permit me to say:

Page 1, paragraph 1, relating to the discrepancy between the reports of the M. & R. on Form 900 and those of the Coiner on Form 901: If the forms are properly filled out, they will probably never show an agreement on the items referred to, because the Melter and Refiner's account of ingots delivered in any particular fiscal year includes those delivered at annual settlement, and the latter cannot be delivered to the Coiner in that year, but, as a matter of course, are delivered to him in the following fiscal year. Also, at the beginning of each fiscal year, the Coiner receives the ingots delivered in settlement of the previous year by the Melter and Refiner; but, of course, they are entirely out of the Melter and Refiner's account of ingots delivered in the year they are received by the Coiner. Considering the items referred to in detail, the Melter and Refiner made and delivered ingots in 1910 as follows: Gold, 1,772,605.060 standard ounces, and Silver, 12,517.60 standard ounces; of the gold, 95,713.200 standard ounces were delivered in settlement and could not go to the Coiner in 1910. Deducting these from the 1,772,605.060 standard ounces leaves 1,676,891.860 stand-

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

and ounces of 1910 ingot product delivered to the Coiner in that year; and to this must be added the amount of ingots delivered by the Melter and Refiner at 1909 settlement which were received by the Coiner in 1910, viz: 78,434.360, which makes a total of 1,755,326.220, which is the amount stated in the letter as that shown by the Coiner on Form 901 in his 1910 settlement, and which is correct.

As to the Silver: The Melter and Refiner did not deliver any silver ingots at settlement in 1910, but during the year had made and delivered, as stated, 12,517.60 std.ozs.; but the Coiner, in addition thereto, received from the Superintendent the silver ingots delivered by the Melter and Refiner at the 1909 settlement, amounting to 40,289.45 std.ozs., which makes the sum of 52,807.05 std.ozs, which is the amount stated in the letter as having been reported by the Coiner on Form 901 for the fiscal year 1910--and that is correct.

As to the Clippings item, it included 782.860 std.ozs. of condemned coin delivered with clippings and charged as such; if that be deducted, it cures the discrepancy.

As to the Condemned Coin item, add the aforementioned 782.860 and also 161.470 (the amount of condemned coin the Coiner turned over to the Commission at settlement, and which enters into the 1911 account of the Melter and Refiner) and it will agree exactly with the Coiner's report.

Page 2, paragraph 1, "The Melter and Refiner in reporting re-

MINT OF THE UNITED STATES AT DENVER.
MELTER AND REFINER'S DEPARTMENT.

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finery operations includes 478.630 std.ozs. gold and 478.94 std. ozs. silver in assay chips, which in my opinion, should have been reported under assay material. In the regular deliveries to the Refinery the bullion used for mechanical purposes has not been reported."

As to the first sentence: The item of 478.630 std.ozs. gold very properly should be, and in the Melter and Refiner's 1910 report was, included under Assay Material in the item, "Regular delivery, 2417.511," but it is assay chips from refinery metal and the refinery is entitled to due credit therefor and the same is properly entered on said report. We charge the Assayer with all refinery assay chips, and at the end of the year, in making our settlement with the Refinery, we give it credit for same; otherwise we could not correctly balance its accounts.

As to the second sentence: We do not use a gold syphon, and as we melt out hangers and V-shaped rod coverings each year for settlement, we do not have any metal to enter under this designation.

Page 2, paragraph 2: In response to this suggestion, I will state that we have always kept a separate account of all chips charged against the Assayer--deposits, ingots, anodes, fine metals, experimentals, etc., but I am not quite clear as to how the Assayer could make separate returns of metal on each class of assays, without much additional work. However, if it is deemed necessary that he should make such separate returns, please advise me, and we will endeavor to comply; but, of course, the account for the current year could not be made exact as more than two months have passed without

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

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any effort having been made by the Assayer to keep the metals separate; and he has already returned 210.066 std.ozs. gold, and 87.39 std.ozs. silver, in one bar, which was composed of chips from various sources. I should like to suggest that, if such separate returns be required of the Assayer, they be divided into three classes only, Deposits, Refinery, and Ingot room.

Page 2, paragraph 4: The monthly statements of operations, Form 65, are press-copied, and my letter-book shows the aggregate net loss in the making of gold ingots to be 326.385, and not 326.382, as stated in the letter. The monthly statements are made by ascertaining the apparent loss on ingot making and deducting the recovery which shows the apparent net loss for the month. But the annual report on Form 900 is made entirely independently of the monthly accounts, and each item is calculated and aggregated for the whole year, and therefore a difference of one or two thousandths of an ounce may easily be caused by handling of the fractions in making the calculations; and, while I was aware of the discrepancy of one thousandth, yet, as the decimal, .386, was correct for the year, it was used in making my annual report.

Page 3, last paragraph: I am not clear as to how I could be any more specific in reporting the causes of the Melter and Refiner's surplus than I was in my last report. It is true that I generalized in the department statement by saying, "Refinery, Ingot room, etc.;" but in the individual statements of the sub-departments, I specified

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 5

the source of surplus so far as I had any knowledge.

As this whole matter, as the letter states, is somewhat in the nature of a criticism and discussion of Form 900, I would respectfully suggest that the printed form be amended to conform as nearly as may be to the corrections made by me in my 1910 annual report.

For instance, take the credit account of "Ingot melting room operations:"

The printed items on said Form 900 are,

"Returned prior to settlement, Ingots"

"Returned at settlement, Ingots"

Chips

Sweeps"

As a matter of fact, the Ingot room does not return anything at settlement other than sweeps, as its returns are completed each day on all other items; so I submit that the changes I made on my report to the form are necessary and substantially correct, to wit:

"Returned prior to settlement, Ingots"

" " " "

in Tops, bars, etc.

" " " "

Ingot Kings, sweeps and
clean-up

"Sweeps returned at settlement"

In the "Sweeps cellar operations," debit side, I think the charge should be in "lbs." and not in "bbls," as the former is easily applicable to all the Mints and is much more exact in its terms, while the latter term cannot be used by us, as we sack

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

superintendent - 6

everything. On the credit side, the item of "Tailings _____ lbs." will always appear and might be printed.

In the Copper account, "Troy ounces," might be replaced in the printed form by "Avoir. lbs."

In the Assayer's account, "Surplus" on the debit side and "Wastage" on the credit side might properly be printed in the form, as one or both must be used each year; I used both in last report--surplus in gold and wastage in silver.

In "Refinery operations," credit side, the three items I inserted, towit,

"Assay chips for the year"

"Bullion retreated--returned for make-up"

"Sweeps at settlement"

might properly be printed, as they will be necessary each year.

This Form 900 is a decided improvement upon anything that ever preceded it, and I am very much pleased with its general make-up, as it exhibits everything in detail so nicely, and as well covers all operations fully.

Respectfully,

John M. Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 9, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Please procure for the use of this department the following articles:

400 sacks for Sweeps Cellar; size 33 inches long and 17 inches wide; hemmed at top and made of moderately heavy grade material; also,

1000 shipping tags and suitable annealed wire with which to tie the sacks and attach tags.

Respectfully,

James Wilson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

September 19, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering the Director's letter of the 16th inst.:

Accounting for the discrepancy between the amount charged to the Melter and Refiner and the amount operated upon, seems to depend largely upon the question as to what is meant by the term "operated upon." If it means only that portion of the amount charged to the Melter and Refiner that is actually melted or used during the year, then there should be some direction to that effect. However, such an item has never been suggested, nor can I see any possible connection that it could have with a clear exposition of the work, as the allowance for wastage is fixed by statute and is based upon the total amount delivered by the Superintendent (as shown by my report). The necessities of the service require us to operate upon all bullion at least twice, once in the Refinery and again in the Ingot room, and unless the annual report shows these facts fully, it would not give a correct statement of the work performed during the year.

Therefore, my ascertainment of the amount "operated upon" was by adding together the respective amounts charged to and operated upon in the Refinery and Ingot room. In my annual report on Form 900, the surplus was in each instance charged against the department.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Superintendent - 2

and included in the "totals," and must be deducted from the latter
to obtain the figures as correctly reported on August 30, 1910.

Respectfully,

E. Wilson

Melter and Refiner.

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MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 30, 1910.

Hon. Frank M. Dwyer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank book for the use of the Melter and Refiner's Department during the present fiscal year. This will not be required before January 1, 1911.

1 Form No. 338 Gold Deposits sent to the Refinery

Number on hand, none.

Respectfully,

J. W. Wilson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

October 3, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In the early part of August, the resignation of R. C. Morrison, Foreman of the Ingot Melting room, was accepted, and he was separated from the service on August 15th, 1910, since which time the operations in that department have been under the direct supervision of W. M. Bush, who previous thereto had been employed as a melter in said room.

He has been in the service for over five years, and is an able and conscientious workman, thoroughly skilled in all kinds of melting, in handling men, and in accounting for his operations.

I therefore recommend that the said W. M. Bush be promoted to the position of Foreman of the Ingot Melting room, to fill the vacancy in said position, and that his compensation be the same as that of his predecessor, \$1550.00 per annum.

Respectfully,

Joseph Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 11, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In response to your reference to this department of the letter of Denver Chaffee, under date of October 8, 1910, I respectfully present the following:

Mr. Chaffee was formerly employed in this department as a melter in the Ingot room, and was furloughed July 29, 1909, with many others, on account of an indefinite shut-down. He has not been recalled to service, nor has any original appointment been made nor helper promoted to take his place. Therefore I do not think that I should be required to answer such hypothetical questions as the first and second set forth in said letter.

As to the third question, we have been operating on a very economical basis and trying to keep our force down to the lowest possible point, partly because our supply of bullion is so limited that it is impossible to determine how soon it may be necessary to furlough some of those now employed, and therefore I have temporarily employed helpers in the Refinery melting room to do the work, when necessary, of one absent melter (not Chaffee) whose place has never been filled in any other way. As these questions may arise in the future, would it not be advisable to ascertain

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

if any authoritative ruling has ever been made relating thereto?

Respectfully,

Wm. H. Miller
Melter and Refiner.

77

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 17, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering that portion of the Director's letter of the 14th inst., referring to the Melter and Refiner's department, I respectfully submit the following:

Following our February, 1910, cost report, the Bureau of the Mint directed us in substance that, upon resuming operations after a shut-down, we should divide the shut-down expenses by the number of months remaining of the fiscal year, and add to the Refinery cost account for each month of its operation, its proportionate share of the said shut-down expense. A reference to the last item of "costs" in the Refinery report for August and September will disclose our strict compliance with the instructions of the Bureau in the premises.

Respectfully,

Foran
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 24, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I respectfully present the following in answer to the letter of the U. S. Civil Service Commission, "File X, Oct. 11, 1910," addressed to the "Director of the Mint," and by you referred to this office:

Mr. Bush, whose promotion is desired, is on the rolls at the present time as a melter in Schedule "D," Subdivision 2," and his promotion will not require a change either in his schedule or subdivision thereof.

Since August 15th, the date on which the former foreman of the Ingot room separated from the service, Mr. Bush has been the acting foreman of said room and has satisfactorily performed all the duties pertaining thereto, which consists of the personal supervision and direction of the details of all work in said room; he continues to perform the ordinary work of a melter, and in addition thereto takes the samples of ingots for assay purposes; determines the temperature of the melts and the time of pouring; makes a complete record of his work, including account of all supplies used; reports his estimates from time to time of things necessary to be purchased for the use of his room; makes sweats of sweepings, charcoal, etc.; delivers his worn-out

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

crucibles and fire-brick to the Sweeps cellar; keeps account of all workmen employed in connection with his work; keeps account of furnace hours for determining amount of distillate used for fuel; and as well keeps account of time that motors operate to determine electricity used, etc., etc.; and at the end of each month makes to this office a detailed report of everything connected with his operations, and at the end of the year directs the clean-up of his department for annual settlement.

Respectfully,

James M. Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 11, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Helena Sweeps, Lot No. 1, 1910, have been disposed of in the
Sweeps cellar, at the following expense:

Labor	\$24.03
Power	10.58
Light & Vent.	3.87
Supplies	2.15
Repairs	<u>1.12</u>
Total	\$41.75

Respectfully,

Joseph W. Maleson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 18, 1910.

Hon. Frank M. Dwyer,
Superintendent, U. S. Mint,
Denver.

Sir:

On September 28th, 1910, we received a delivery from The Mine and Smelter Supply Co., of 51 No. 3 and 51 No. 4 graphite dipping cups, which we cannot use on account of their being too heavy, as they weighed, respectively, 46.20 and 55.65 troy ounces each. The contract under which they were furnished specified that the weight of the No. 3 should be 31.5 and the No. 4, 35 troy ounces. The matter was taken up with the said company immediately after the receipt of the goods, and has been under discussion and consideration since that time, and I now recommend the rejection of these supplies.

As our stock of the old cups is running low, I further recommend that the said The Mine and Smelter and Supply Co. be requested to furnish us at the earliest possible moment with 50 No. 3 and 50 No. 4 cups of the weights specified in their contract. However, if it would facilitate their work of producing these new cups, we could use the No. 3 weighing 32 to 32.5 troy ounces, and the No. 4 weighing 36 to 37 troy ounces.

Respectfully,

John W. Nelson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

December 9, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

About the middle of last month, Mrs. Milson had an especially severe attack of nervous prostration, from the effects of which she does not show any recovery; in fact, the physician is afraid of another attack in the near future if some change cannot be effected that will benefit her, and he advises an immediate removal to a low altitude.

She cannot travel without me, and I therefore request a leave of absence from my duties at the Mint for thirty days; and I hereby designate my assistant, J. M. Hetrich, to attend to my official duties during such absence.

Respectfully,

J. W. Milson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 31, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Between the hours of 8 and 9 a.m. this day, by my personal orders, Michael Howard, helper in the Ingot melting room of this Mint, took a quantity of material from said Ingot melting room to the melting room of the Refinery, for the purpose of fitting same for fluxing, by grinding it in a small Chilian mill, in said room. Upon the completion and return of the lot as above, I again ordered Mr. Howard to take another similar lot and put it through the same process. While engaged upon this duty, his right hand was caught by one of the revolving wheels of the mill, and very seriously injured,--to what exact extent, I am at the present time uninformed.

Mr. Howard has always proven himself a model workman and man.

Very respectfully,

Jack H. Metrick
Acting Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

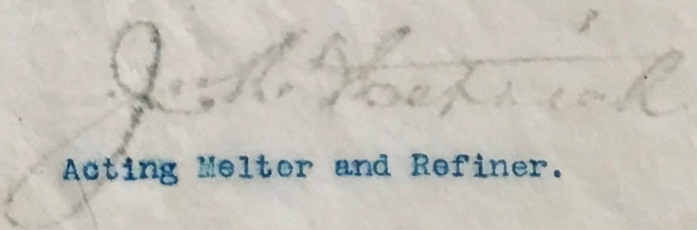
January 7, 1910.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I hereby respectfully recommend the restoration of Mr. J. Frank Pughe to the position of clerk at the salary of \$1600 per annum. Mr. Pughe has recovered from the severe indisposition from which he had been suffering the past fourteen months, and is now able to resume the duties he resigned at the time he was taken sick; and his services are required for the good of this department as a qualified general utility man, as well as for his clerical services.

Respectfully,


Acting Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 24, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The recent death of Michael Howard created another vacancy in the helper force of the Ingot melting room; and it is necessary to fill said vacancy as soon as we conveniently can. On July 29th, 1909, Denver Chaffee, a melter in the Ingot room, was furloughed, and now wishes to be recalled to fill said vacancy.

I therefore recommend that Denver Chaffee, furloughed as a melter, be recalled and reduced in rank to the position of a helper in the Ingot room at the regular per diem of \$3.50.

Respectfully,

James Milson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 24, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

We have four furnaces in the Refinery melting room, and at present the force of melters consists of the foreman only, as the other two melters were transferred to the Ingot melting room-- Bush on June 17th, 1910, and Gray on November 25th, 1910--which necessitated the use of helpers to do the Refinery melting of which we have considerable.

George N. Spencer was appointed to the position of helper in the said melting room February 12th, 1906, and Samuel R. Whitaker was similarly appointed on May 7, 1906; they have both rendered very satisfactory service, and long ago acquired the ability to perform the duties of a melter; in fact, they have been performing such duties in the absence of the melters for a considerable length of time, and they have performed the additional work cheerfully and with much care.

I therefore earnestly recommend that George N. Spencer and Samuel R. Whitaker each be promoted to the position of melter in the Refinery melting room, at the regular per diem compensation for such work, viz., \$4.50.

Respectfully,

John W. ...
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 24, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

On January 23d, 1906, George J. Bucher was appointed to the position of a helper in the Refinery, and soon thereafter he was transferred to the Assay department as a helper; and I think he is now classed as a cupellar, from which position he was furloughed Sept. 30, 1909. Owing to the necessary transfer of two men from the Refinery to the Ingot room, our force in the Refinery is cut down to such an extent as to materially affect our production; and I therefore recommend that said George J. Bucher be recalled from furlough as soon as convenient and assigned to the position of a Refinery helper at the regular compensation of \$4.00 per day.

Respectfully,

John W. ...
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 1, 1911.

Mr. E. R. Leach,
Melter and Refiner,
U. S. Mint,
San Francisco, Calif.

My dear Sir:

Your letter of January 25th discloses a peculiar misunderstanding regarding the treatment of sweeps in this institution.

I discussed the matter quite fully with Mr. Mindeleff, his position being that it would be more economical to ship the sweeps of all kinds to a smelter, without any mint treatment whatever, and sell them as ore is sold, because, to illustrate, the average cost of treating sweeps at the mints of San Francisco, Philadelphia, and Denver, for the year 1909, as obtained from official cost reports, was, approximately, \$52.28 per ton, to which must be added the smelter cost of treating the tailings, say, \$10.00 per ton (that is the amount we pay), making a total cost of \$62.28 per ton; and his contention was that the smelter would do the work for, in his opinion, from \$15 to \$25 per ton, or in any event, for less than one-half the amount it was costing under the present system.

We discussed the elements of safeguarding the shipment to the smelter, as well as the sampling, and he thought such matters could be taken care of with safety and without any trouble.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Leach - 2

I had not given the matter sufficient consideration to venture any opinion further than to admit that apparently it would be more economical than our present system. The matter was not referred to thereafter, and we continue to treat the sweeps in this Mint according to the system I inaugurated when we first started operations, except as to a few changes made for the betterment of the process.

While I am on this end of the subject, I will explain the material changes we have made from the system installed in your Mint: We have never used a concentrating table for the tailings, because, although it was part of my original plan and justified by previous experiments, we have never had the room available for its installation, and we get along quite nicely without it. We have discarded the use of the Pierce amalgamator as originally applied, and now discharge from the apron of the mill direct to copper plates 18 feet long, at the lower end of which we place the Pierce amalgamator, making it the connection between the plates and the settling tank, and thus using it specially as a quick trap; and we find the change quite beneficial in the saving of metals. We sometimes use quick in the mill itself, and find the loss from flouring very small.

I have finally come to the conclusion that the old plate amalgamation cannot be beaten, at least for the treatment of graphite sweeps. As to my opinion regarding Mr. Mindeleff's suggestion on this question, I think the whole proposition rests largely on the

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Leach - 3

matter of sampling at the smelter; our graphite sweeps are difficult to sample under the most favorable circumstances, and at a smelter where they are run through as ordinary ore, I do not think we could possibly get satisfactory results. But if they could be reduced to a very fine mesh and the metallics all screened out, perhaps we could get satisfactory results. However, the loss in price per ounce, 67 cents on gold and five per cent of the market price on silver, together with other "allowances," would be a direct loss to the Melter and Refiner on his sweeps, as against the credit of actual values under the present system. The only smelter operating in this city is the Globe of the American Smelting & Refining Company.

I am glad you wrote me, and hope you will repeat whenever the spirit moves you. I remain,

Very respectfully,

Frederick
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 7, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The gain on 125 melts of gold ingots made between August 18th and December 23d, 1910, inclusive, being the difference between the actual fineness (as reported by the Assayer) and standard, amounted to 44.78 ounces; and the copper added to the same melts for oxidation and volatilization and which was not charged against the Ingot room, amounted to 73.75 ounces, a total of 118.53 standard ounces, which does not appear in any way as a charge against the Ingot room, but which certainly covers up that amount of operative wastage.

Respectfully,

J. W. Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

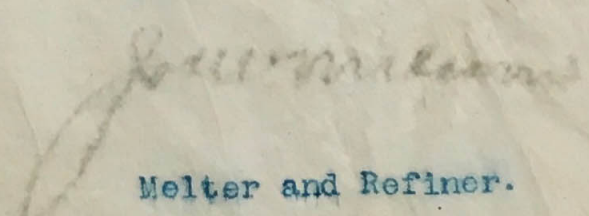
February 8, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The gain on 293 melts of gold ingots made between January 3d and June 24th, 1910, inclusive (all the gold ingots made during the 1910 fiscal year), being the difference between the actual fineness and standard, amounted to 84.360 ounces; and the copper added to the same melts to cover loss by oxidation and volatilization, amounted to 218.750 ounces, making a total of 303.110 standard ounces, which does not appear in any way as a charge against the Ingot room, but certainly covers up that amount of operative wastage in said room. The amount operated upon was 1,842,227.820 ounces, std.

Respectfully,


Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 6, 1911.

Hon. D. K. Tuttle,
Melter and Refiner, U. S. Mint,
Philadelphia.

Dear Sir:

There appears to be some probability of our making a few bronze coins in the near future; and, as we have no one connected with this institution that has ever had any personal experience in coining cents, I would like to get some information on the subject from an authoritative source to either confirm or replace that which I am now possessed of. I therefore respectfully ask you to answer the following questions as fully as may be necessary to give me a completer understanding of the methods used, and as well to give me any other information which I may not specifically have asked for, but which would be beneficial to a thorough knowledge of the subject:

1st. The proportion of copper is 95% and the alloy 5%, composed of tin and zinc. How is the 5% divided as to the tin and zinc? And is the division a fixed one? or can it be varied if necessary to change the ductility of the ingots? How is the alloy prepared? in what quantities? and in what form is it cast? Is there much, if any, loss in making the alloy? What quality of tin and zinc is used? What kind of a stirrer is used?

2nd. As to making the ingots: What steps are taken in melting the copper to prevent oxidation? At what stage of liquefaction is the alloy added? What steps are taken to prevent the oxidation

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Tuttle - 2

or volatilization of the alloy? Is the metal poured very hot? Is there any considerable loss of alloy, or sufficient to require an excess of alloy in the make-up? Are the melts numbered as other ingot melts, and are the individual ingots numbered? Are the ingot melts preserved separately, or are they dumped together indiscriminately? What is the size of crucibles used in this work, and what is the average weight of the melts? What is the exact size of the ingots and how many blanks in width are cut from a strip? How many melts are made by each melter in a regular day's work? How many ingots to the melt? Are the ingots cooled in water immediately upon being taken from the moulds? What kind of a stirrer is used?

3rd. How often are assays made, and are they from granulation samples only? Would the assay samples, if taken from the ingots, represent the actual proportion of the metals in the ingot? Are any bronze ingot melts ever remelted or condemned, and if so, at what variation from the standard?

4th. Please add any other necessary details.

I will fully appreciate your kindness in advising me in this matter, and earnestly thank you for all courtesies extended.

Respectfully yours,

John W. Miller
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

March 11, 1911.

Hon. Frank M. Dwyer,
Superintendent, U. S. Mint,
Denver.

Sir:

In regard to the recent purchase of tin and zinc for minor
coinage (cents), under a guarantee of 99% pure:

I have procured a number of analyses of each metal, and as
to the tin, it is entirely satisfactory, the Refinery analysis
showing 99.55% and the Assayer's, 99.90%.

The zinc has been a much more difficult proposition. I took
the first sample from a zinc slab (hereinafter referred to as No. 1)
by cutting off two corners, giving one corner to the Foreman
of the Refinery and the other to the Assayer. They each ran two
sets, which in each instance checked well, with the following
result: Refinery, 98.27%; Assayer, 98.53%. I then took samples
by drilling from a zinc slab (hereinafter referred to as No. 2),
giving the A (top) sample to the Assayer, and the B (bottom) to
the Foreman of the Refinery. The Refinery ran four sets with a
good check on all of them, and the Assayer ran three sets with a
good check, showing the following average contents of zinc:
Refinery, 98.06%; Assayer, 98.16%. The Assayer then made a fresh
standard solution, and ran three more sets from No. 2 slab, which
checked very nicely, and gave an average of 98.75% zinc.

This shows fourteen analyses, with a final average of

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Superintendent - 2

97.65% zinc, which is considerably under the guarantee, and which also shows a difference of 2.42% between the two slabs analyzed, proving an irregularity in fineness that is quite objectionable.

However, for the purpose of determining the effect of the impurities in actual use, I took the unused portion of the samples furnished the Refinery and the Assayer from No. 1 slab, amounting to 4.48 ozs., and of a determined fineness of 95.90% zinc, and used it to make 7.46 ozs. of alloy, and with that alloy and the proper amount of copper, I made two ingots yesterday and had them rolled out this forenoon by the Coiner, and of the dozen experimental ingots that the Coiner has rolled, there was none that exceeded them in ductility or smoothness of edge, and the alloy showed contents of 94.9 copper and 5.1 alloy.

Respectfully,

Joel Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 25, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

This department is in need of the following articles for use in the Refinery:

Six earthenware conical storage vessels with discharge socket; internal diameter, top 30", and bottom 18", and internal height 18", similar to Fig. 148, heretofore furnished us, but without the sieve plate and stop cock.

Also, six earthenware tanks with 1-1/2" wall and the following inside measurements; length 47", width 23-1/2", and depth 23-1/2"

Our purchase of earthenware goods of this class heretofore has been exclusively from Frederick Bertuch & Co., 907 Temple Court Bldg., New York, and I know of no other place to procure them.

Respectfully,

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 4, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir;

The communication of J. W. Sittig, dated March 30th, 1911, correctly states our desires as to his understanding of our order. His recommendation that we have a rim made on the upper edge of the earthenware tanks is very good, and I earnestly recommend that he be advised to make said tanks with such rim on each.

Respectfully,

J. W. Sittig
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 5, 1911:

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank book and blank forms for the use of the Melter and Refiner's Department during the next ensuing fiscal year. These will not be required before July 1, 1911.

Form No.	No. on hand	No. wanted	
492-E	None	1	M. & R.'s Requisitions for Supplies
65	12	100	M. & R.'s Operations (ingot)
929	200	1000	Melts for Parting

Respectfully,

Samples attached

John A. Milburn
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 6, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

On February 18th, I requested the purchase of one barrel of MXX charcoal for gold, and on March 10th The Mine and Smelter Supply Co. (being the contractor for that brand) delivered under said requisition and a previous order three barrels of charcoal that was entirely different from the kind ordered or heretofore furnished; and as the same was wholly unfit for use in any of our work, it was rejected, and on March 14th was returned to said company. I then requested that one barrel of the proper kind be procured for us at the earliest moment possible, and in response thereto, the said company procured and delivered to us another barrel, but of precisely the same kind we had rejected on March 14th; so on yesterday it was rejected and the said company notified that the same was held subject to their order. And now we are out of charcoal for gold with three weeks' gold work confronting us.

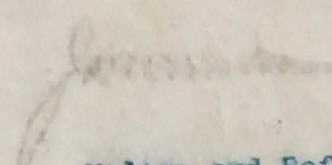
I therefore respectfully suggest that said The Mine and Smelter Supply Co. be required to procure for us by wire order and express shipment one barrel of the kind of charcoal its contract calls for, under the designation "MXX for gold," which is a very dark,

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

finely pulverized, and very heavy charcoal, supposed to be made of willow, or partly willow, and of the same kind formerly furnished us by the same charcoal factory through the Denver Fire Clay Co., and which I am advised was made specially by said charcoal factory for our gold ingot work.

Respectfully,


Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 11, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Nels A. Russell was appointed a helper in the Refinery September 12, 1910; he does his work in a careful and competent manner, and has served more than the customary six months probation. I therefore recommend that his pay be increased to \$4.00 per day, being the amount received by the other helpers doing the same class of work.

Respectfully,

John W. Downer
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 11, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

On the 1st inst. you took over the management of the Sweeps cellar for the purpose of operating the same by the Deposit Melting room force; that act relieved Elmer S. Smith, skilled workman, from his position as foreman of the Sweeps cellar at a per diem of \$4.50.

Mr. Smith is a competent and industrious workman, and I therefore recommend that he be transferred to the Refinery as a helper at the regular wages for such position, viz., \$4.00 per day. Upon the approval of this transfer, he will take the place in the Refinery now filled by D. Todd Howbert who will be transferred to the Ingot melting room as a helper at his present wage of \$3.50 per day, which is the regular payment for that position.

Respectfully,

Ed W. Miles

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 11, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

On June 17th, 1910, Wm. M. Bush, a melter in the Refinery, was transferred to the Ingot melting room, and thereafter, on August 16th, was appointed Foreman of the said room. At the time of Bush's transfer, George N. Spencer, a helper in the Refinery, was temporarily placed in charge of a furnace in Bush's place, and has run said furnace and performed all the duties of a melter well and faithfully ever since; and owing to Bush's permanent removal from the Refinery it is absolutely necessary for said Spencer to continue doing a melter's work in the future. I therefore recommend that he be regularly promoted to the position of a melter at the usual wage for such work, to wit, \$4.50 per day.

Respectfully,

Wm. M. Bush
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 14, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I have carefully considered the Director's letter of March 17th, 1911, referring to the question of loss in ingot work, and as well the letter of Mr. F. P. Dewey, Assayer, Bureau of the Mint, dated March 16th, accompanying the Director's said letter; and with your permission, I desire to respectfully refer to some of the matters set forth in said letters.

First as to the Director's letter: In making up ingot melts, this department is absolutely controlled by the official certificates of the Assayer as to the fineness of the ingots, and the addition to or deduction of copper from any melt after the make-up is with the sole object of producing ingots of actual standard fineness; and I have never taken into consideration any gain in fineness by oxidation in bleaching operations by the Coiner.

On August 15th, 1906, Mr. J. M. Hetrich was appointed Assistant Melter and Refiner, and my first instruction to him was to make up all melts so as to produce ingots of standard fineness, which had not previously been the practice, owing to directions of my then Assistant who had charge of said work.

Now, as to Mr. Dewey's letter: I do not believe we are open

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

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to the charge of making up gold ingot melts to only 899.9; and my letters on this subject dated February 7th and 8th, 1911, cannot justify the statement that "It is therefore evident that the addition of extra copper to the ingot melts at Denver ought to be stopped," because the first letter shows that the gain on gold ingots from August 18 to Dec. 23, 1910, was 44.78 standard ounces, and the copper was 73.75 ounces; so that, if the latter had been stopped, we would have suffered an actual loss of 28.97 ounces of gold, and our ingots would have been that amount in excess of standard. The second letter shows that the gain on gold ingots during the 1910 fiscal year was 84.36 standard ounces, and the amount of copper added was 218.75 ounces; so that, if we had not been permitted to add the copper, we would have sustained an actual loss of 134.39 ounces, and our ingots would have contained that amount of gold in excess of the legal standard of 900 fine.

Our every effort in the making of ingots is to produce them of standard fineness, and the addition of copper is not the only step taken, as in silver work we frequently deduct copper; in fact, in making silver ingots from Dec. 24, 1910 to March 21, 1911, inclusive, (using Mexican fine silver) we arbitrarily deducted from the melts as made up from two to three and one-half ounces of copper--a total, in fact, of 98-1/2 ounces in 42 melts.

I therefore respectfully submit that our methods in this work should not be changed, as it would result in our ingots being above standard, thus causing a loss without any possible

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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opportunity of recouping the same.

Respectfully,

James M. [unclear]
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

April 18, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Upon your receipt of my letter of the 14th inst., relating to the addition of copper to gold ingot melts after the make-up, you requested me to omit the addition of any copper to one melt for the purpose of showing what effect it would have upon the assay; and the next day, Saturday the 15th, I made three gold ingot melts, Nos. 299, 300, and 301, and added one-half ounce of copper each to Nos. 299 and 301, but did not add any to melt No. 300, and the Assayer reported Nos. 299 and 301 each at .8999 and No. 300 at .900 fine. On the face of it, this would seem to show the effect of the addition of the copper very clearly, but it does not do so as shown by the following facts. I submit figures obtained from the Assayer on six melts, Nos. 296 to 301, inclusive; these are the last melts reported and are approximately of the same composition, to wit:

	Make-up	Tops	Clippings	Total
Nos. 296, 297, 298	13,227.62	412.13	5,201.72	18,841.47
" 299, 300, 301	13,321.39	592.89	5,406.01	19,320.29

The said melts and the separate assays thereof are as follows:

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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<u>Melt No.</u>	<u>Reported</u>	<u>Separate Assays</u>			<u>Amt. Copper Added</u>
		<u>First Ingot</u>	<u>Last Ingot</u>	<u>Granula- tion taken at middle of melt</u>	
296	900	a. 900 b. 900.1	900 900	900 900	1/2 oz.
297	900	a. 899.9 b. 900	899.9 900	900 899.9	1/2 "
298	900	a. 900 b. 900	900 900	900 899.9	1/2 "
299	899.9	a. 899.9 b. 899.9	899.9 899.9	899.9 899.9	1/2 "
300	900	a. 899.9 b. 900	900 899.9	899.9 900	none
301	899.9	a. 899.9 b. 900	899.9 900	899.9 900	1/2 oz.

* From this table it appears that out of five melts with one-half ounce of copper added to each, we got three that were reported 900 fine and two 899.9 fine; but the particular thing that I desire to call your attention to is the last two melts. On melt 300, three of the six assays were 899.9, and three were 900, and it was reported 900 fine; on melt 301, the separate assays were precisely the same, three 899.9 and three 900, and it was reported 899.9; and Mr. Bowen, Assistant -- and in Mr. Hodgson's absence, Acting -- Assayer, told me that sometimes an average was made on a day's work. For instance, I would gain a fraction of a point on No. 300 and lose precisely the same fraction on No. 301; and he said that No. 300 might very properly have been reported 899.9

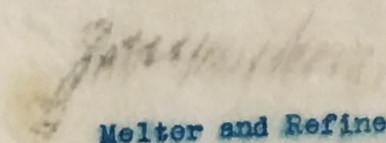
MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

and No. 301 at 900 fine; and of course if this had been done the Assayer's official certificate of the fineness of the ingots would not have disclosed any effect from the omission of the extra half ounce of copper from Melt No. 300. The table shows that out of 36 assays on ingots, not one exceeded one-tenth of a point either above or below standard; and that certainly evidences a very close agreement on the assays.

Respectfully,


 Melter and Refiner.

* 302	899.9	a. 900 b. 900	900 900	899.8 900	1/2 oz.
303	900	a. 900 b. 900.1	900.1 900	no assay 900	1/2 "
304	900	a. 900.1 b. 900	900.1 900	900 899.9	1/2 "

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 5, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to that portion of the Director's letter of July 8, 1910, relating to the Melter and Refiner's Department, I respectfully present the following statement:

The only crucible we use in this department is the No. 80 Mint special (during the period of ten months just passed, we used only one of any other size, and that was a No. 14 for small experimental purposes); and during the time specified the Ingot room used the Dixon crucible, and the Refinery used the Gautier. The Ingot work was as follows:

Metal	No. of crucibles	No. of melts	Weight of metal	Av. wt. of melts
Gold	30	310	1,973,205.28	6,365.17
Silver	32	360	1,510,620.79	4,196.16

And in addition to the foregoing melts, the same crucibles were further used in making 163 other melts of experimental bars and sweats.

In the Refinery, we use new crucibles on fine gold two or three times, and on fine silver about eight times each, and then relegate them to other and baser melting purposes, because a crucible cracks occasionally, and we try to prevent such accidents occurring with fine metals. But our operations in this respect

MINT OF THE UNITED STATES AT DENVER,
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practically preclude even an approximate showing of crucible use on fine metals in the Refinery. I will, however, present a statement of all new crucibles used in the Refinery, together with the number of melts and weight of metals, but the figures will show very little as to the life of crucibles on any particular metal:

Metal	No. of Crucibles	No. of Melts	Weight of metals in gross ounces
Fine gold	84	225	1,474,363.33
Gold anodes	11	58	389,850.30
Gold from silver cells	10	244	1,073,800.00
Gold special (anodes)	5	6	63,848.58
Gold slimes	0	107	214,000.00
Gold tops	0	48	225,600.00
Total, gold purposes	110	688	3,421,057.21
Fine silver	33	270	1,255,972.80
Silver anodes	25	561	2,947,632.23
Silver slimes	0	150	600,000.00
Total, silver purposes	58	981	4,802,855.03
Copper and zinc	6	23	76,200.00
Sweats	2	297	amount unknown
Refinery totals	176	1,989	8,300,112.24

You will notice that no new crucibles were used for gold slimes, gold tops, or silver slimes, only 2 for 297 sweat melts, only 10 for 244 melts of gold from silver cells, and only 25 for 561 silver anode melts. But in all these instances the secondary use of crucibles (first used for fine metal melts) will explain the matter.

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In conclusion, the figures show that 174 crucibles made 1,692 melts of over 8,000,000 gross ounces, and with the addition of two new crucibles made 237 other melts (sweats), the weight of which is unknown.

Respectfully,

J. W. Wilson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

May 13, 1911.

Mr. E. R. Leach,

Melter and Refiner, U. S. Mint,

San Francisco, Cal.

My dear Mr. Leach:

Soon after we began coinage operations in the Denver mint, we had a special crucible made for us by the Dixon Company which we then designated "No. 70, Mint Special." At that time bids were received at so much per crucible, but later, when competition increased, the bidding was by "numbers" of crucible at so much per number; and the various bidders changed the designation of our crucible to "No. 80, Mint Special" (which was fair), and it so remains at the present time.

We have used only the Dixon and Gautier goods in our work, and find the life of the crucibles practically the same, but the Gautier holds about 300 more ounces fine gold than the Dixon. The Refinery foreman prefers the Gautier, and the Ingot foreman, the Dixon; and during the current fiscal year, each has been supplied accordingly, as we carried over from the previous year a sufficient number of Dixons to supply the Ingot room for this year.

The sizes of the two makes differ a little (although both are supposed to be made from the same specifications); and are in inches as follows:

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	Dixon	Gautier
Height inside	14-7/8	15-3/8
" outside	16-3/4	16-7/8
Diam., top inside	9-7/8	10-1/8
" " outside	11-7/8	12-1/8
" bilge, inside	10-5/8	10-13/16
" " outside	12-5/8	12-7/8
" bottom, inside	6-5/8	6-3/4
" " outside	8-1/4	8
Capacity, gold, fine ozs.	8,700	9,000
" std. metal, gold ingots	7,200	

The figures on capacity represent the largest melts we have made, but our averages are considerably less. Our fine gold melts, 1910 fiscal year, averaged 7,330 standard ounces, and our ingot product for same term, 6,050 ounces per melt.

If this does not fully cover the information desired, please advise me, and I will supplement it in any way you wish.

By the way, on April 1st, the General Department took over the Sweeps cellar, and has since been operating it with the Deposit melting room men at times when they are not busy with deposits.

Respectfully,

James M. Leach
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 18, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Upon careful consideration of the bids on fire clay supplies for the fiscal year 1912, I find a number of articles for which the bids are equal or approximately so; but having in mind the results we have obtained from the use of these various articles, I recommend that the contract for the following be awarded to The Denver Fire Clay Company, viz:

Fire brick (including soaps and splits)

Quarter Slides, S. 170

" " S. 20

Furnace Top Slabs, S. 163 G.

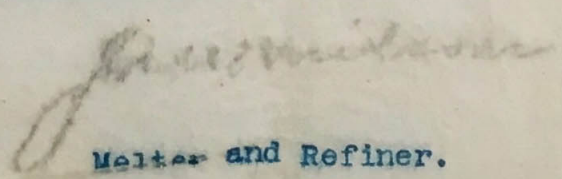
Pedestals, S. 195

Arch Tile, S. 41 D. 2937

" " S. 41 E. 2938

Hood " S. 41 A. 2934

Respectfully,


Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 22, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Under date of April 22, 1911, Mr. Slaker, in a letter to Mr. Hodgson, stated that the Refinery at Philadelphia "had a system in operation since February 10, 1910, and sufficient data had now been accumulated from which to draw up specifications covering conditions."

In November, 1910, Mr. Mindeleff, who had just come from the Philadelphia mint, stated to Mr. Wirth that the pulsating current work at that mint was by the use of a direct current with rise and fall of same, produced in the winding of the machine, to get the pulsating effect without the use of an A.C. generator. In September, 1910, the specifications for our motor generator set, to produce the pulsating current, were mailed to the Bureau of the Mint, and Mr. Slaker in his letter above referred to says they were referred to his department for inspection.

About the first of the present month, Mr. Hodgson forwarded to you a copy of the specifications for the New York motor generator sets, and an examination of them discloses that Mr. Slaker has abandoned the use of the system that he was operating when Mr. Mindeleff was there, and has changed to the use of an A. C. generator in connection with the D. C. generator, both on the

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MELTER AND REFINER'S DEPARTMENT,

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same drive shaft and operated by one motor. The generator sets for New York are now the same as ours with slight differences in capacity and minor details of construction. We made an error in our plans relating to the switchboard, and the same error runs all through the New York plans.

Under date of April 24, 1911, Mr. Hodgson wrote you about a discussion he had with Mr. Slaker regarding our pulsating current generator, and among other things said -- referring to Mr. Slaker -- "He also informed me that Mr. Mindeleff did not recommend the purchase of the large generator at this time, but agreed with him to have Denver wait until the installation of the New York equipment."

Under date of May 13, 1911, Mr. Mindeleff wrote a personal letter to Mr. Wirth, and among other things said, "The last time I saw Mr. Roberts was at the Annual Assay Commission at Philadelphia; he then had my preliminary report on the Denver Mint in which I very strongly recommended that the outfit be furnished you as per your requisition. He did not quite like spending that much money and called in Slaker who took the standpoint that as long as they were going to install such an outfit in the New York refinery, they had better wait and see how it panned out before putting it in Denver. He was'nt quite sure that it would prove as good as they expected, etc., etc. You know that Mr. Slaker is rather inclined to belittle anything that does not come from Mr. Slaker. I took the standpoint that its value had already been proved at San

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MELTER AND REFINER'S DEPARTMENT,

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Francisco, and stated that it would very rapidly pay for itself. .

. . . In my final report sent in some two weeks after this I again recommended that you be furnished with the large outfit. .

. . . If Mr. Slaker is quoting me as an authority why you should not have the large outfit, he is twisting things to suit his own views."

From the foregoing, it appears quite clearly that Mr. Slaker changed his plans after inspecting ours (and that the error regarding switchboard in ours is reproduced throughout his), and that Mr. Mindelleff does not agree with Mr. Slaker as to what was his (Mindelleff's) attitude with reference to our receiving the large set so earnestly desired by us.

Respectfully,

James Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

June 12, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Mr. Herbert H. Winn, an employee of this department from February 1st, 1906, to May 5th, 1910, has applied for an extension of the time within which he is eligible for reinstatement, as set forth in his application therefor, which I have attached hereto. Mr. Winn was a first-class workman in his position of helper in the Refinery, and I regretted the necessity which required him to give up his work here, so that he could move to a lower altitude on account of the ill health of his family. As to his reasons, presented in support of his application, I believe the first, and I know the second and third are true; and I earnestly recommend that the extension of time asked for be granted.

Respectfully,

Joseph Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

July 6, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I have carefully considered the Director's letter of June 28th, and the accompanying copy of what is proposed as a new form for "Register of Deposits," and respectfully comment thereon as follows:

First, in a general way: The Register of Deposits now in use in the Denver Mint is an ample and sufficient record in every respect and for all purposes; we use the one form for "Gold" or "Silver" deposits, and we do it without any interlining or insertions of any kind on heading of pages, as contemplated by the proposed new form. On the outside of book we mark "Gold" or "Silver," together with the number. On the inside the ruling and printing are exactly the same, and it is precisely the record we desire in our work; and we respectfully protest against any change.

Secondly, in detail concerning the proposed form: I have not had the privilege of examining the forms used in other Mints and perhaps that is the reason that several items of the proposed new form are not clear to me. But, as to headings, the 2d and 5th columns are respectively designated, "Assay number and "Bar number;" the "Assay number" should be eliminated, as they are both the same, the Assayer taking the number from the certificate of the Weigh Clerk, and the "Bar number" being the original step in the identifi-

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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cation of the deposit, should follow, as such, through all transactions, and it should be in column 2, being the first column following the date.

"Melt number" in column 3 is entirely superfluous, because, if it means anything, it means the anode melt number, and that is provided for in column 10.

"Division of melt" in column 4 is wholly without meaning to me. "No. of bars" in column 6 is unnecessary, as a deposit rarely consists of more than one bar, and when it does we dispose of it by putting the number of bars in front of the "Bar no." thus, 2--596; however, there is no objection made to this column, but if it is used, it should be next to "Bar number," that is, column 1, "Date;" column 2, "Bar number;" column 3, "No. of bars."

Column 10, "Anode No." is not objectionable, except as to its location. We do not use such a column, but if put in the new form it should not be between the gross weight and fineness columns; it might follow the "fineness" column or be placed next to charges column on the right of the page.

"Fineness" in column 11 is incomplete, because it does not show which of the three columns is gold or silver. The Register of Deposits is a record of actual finenesses, and the finenesses are not entered until the Assayer has finally determined them; so the first column under the general heading of "Fineness" designated as "Est.," should be eliminated entirely, and the remaining two columns should be designated "Gold" in the first, and "Silver" in the second.

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Another column should also be added on the extreme right and designated "Bar No.," to correspond with the "Bar No." on left of record, for convenience of cross reference.

The complete record should be on one page, and not on two as contemplated by the new form; because it is easier to work on a line complete on one page than it is to cross over the break of the book to a second page.

The horizontal lines should be $\frac{3}{8}$ inch apart instead of $\frac{1}{4}$ inch, because the register is kept posted from the certificates right up to the minute; and if, in a transfer of deposits, it is necessary to fall back a day on account of deposit remelts or any other reason, there would not be sufficient room to foot the columns and put in an additional row of figures, if the lines were only $\frac{1}{4}$ inch apart.

As to the spacing of the columns, they are not consistent; for instance, "Bar weight," column 7, and "Gross weight," column 9, each have $\frac{5}{8}$ inch space for whole ounces, and that is all right; but the corresponding columns under "Standard weight" and "Total standard weight" have only $\frac{3}{8}$ inch space; these should also be $\frac{5}{8}$ inch.

All of the clips columns are $\frac{5}{16}$ inch for the thousandths, yet it must have three figures, and all other three-figure columns are $\frac{3}{8}$ inch, and this should be.

The fineness columns are $\frac{7}{16}$ inch; yet most of the finenesses are three figures and a fraction, and should have $\frac{1}{2}$ inch space.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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Under the heading "Standard weight," the first "Bars--Chips," half should be designated "Gold" and the second "Silver," and the same should be printed under the other, following heading "Total standard weight." It is entirely unnecessary to leave these latter sub-heading spaces blank to be filled in by the Melter and Refiner, because they can be printed, as I have indicated, and the headings "Gold" for the first and "Silver" for the second are quite sufficient, as it is not necessary to say "Gold and Silver" or "Silver and Gold," because all of our deposits contain both metals (it wouldn't make any difference if they did not), and if the gold predominates it is a gold deposit; if the silver is in excess it is a silver deposit; and the idea that these sub-headings should be changed (inserted by the M. & R.) according as the deposit be Gold or Silver is erroneous, as the only difference between a gold and silver certificate in form is that in a gold certificate the gold fineness comes first and in a silver certificate the silver fineness comes first. But regardless of the order, the respective finenesses can certainly be placed in the appropriate column of fineness.

By the way, while I am on this subject, permit me again to call your attention to the fact that we began bronze operations in this Mint last April, and we have never had a blank or record book of any kind relating to this work.

Respectfully,

John W. ...
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 13, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In the rush of settlement, I did not personally check up the report made to me on remelts of ingots; and stated that there were no ingot melts either condemned or remelted. Yesterday I discovered that that statement was erroneous, as there were seven melts of silver ingots remelted in 1911. This correction should be made on the statement furnished by me at settlement on form 900. I therefore request that this communication be forwarded to the Bureau for that purpose.

Respectfully,

Joe W. Wilson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 29, 1911.

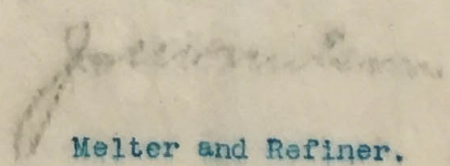
Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

You will pardon me for again calling attention to the fact that we began making bronze ingots in April last, and notwithstanding former requests therefor, we are still without any record books or blanks of any kind relating to said bronze operations. Our records of said ingot work have been made on loose sheets of paper, from which we intended to transfer them to suitable record books when the latter should be furnished to us. We do not expect to lose any of these sheets, but owing to the possibility of such loss I am very anxious to get the matter straightened out and properly disposed of in keeping with the methods obtaining in this office.

I therefore earnestly request that I be furnished with the necessary record books and blanks pertaining to bronze operations at the earliest possible moment.

Very respectfully,


Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 21, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I respectfully ask permission to be absent on vacation the balance of this month. I hereby appoint my assistant, Mr. J. M. Hetrich, to perform the duties of my office during my absence.

Respectfully,

James Wilson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 5, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In response to the communication from the Mint Bureau, under date of August 30th, referred to this department, I respectfully present the following:

All of the bullion "returned prior to settlement" was actually operated upon; but of the bullion "returned at settlement," the following was not operated upon, to wit:

	Gold	Silver
Treasury purchase silver, std. ozs.		444,819.01
Gold deposits "	68,616.174	6,106.56
Silver " "	6,524.862	28,662.69
Re-deposits from assay offices "	190,205.965	44,541.08
Totals	265,347.001	524,129.34

But these figures do not at all correspond with the amount of bullion actually operated upon in this department, to wit:

The Refinery operated upon bullion in gross ounces, 3,668,298.58
Ingot room operated upon bullion in standard ounces, 3,704,359.32

Together with a number of minor items, such as "coiner's bars," "experimentals," etc.; and of course all the bullion sent to the Refinery is operated upon at least twice in that department, whereas the above figures of 3,668,298.58 is the amount sent to the Refinery, and is accounted for as only one melting of same.

Respectfully,

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 9, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I submit herewith a communication just received from the Foreman of the Refinery, relating to the pulsating current and the motor generator set for producing same. Mr. Wirth has gone into the matter very thoroughly, and has been extremely careful in all the work done along this line; and his statements are entitled to full faith and credit.

I therefore most earnestly recommend the purchase of the large motor generator set, and particularly that the set be precisely the one we have specified. I have received the impression that the specifications formerly presented have been mislaid in some way; and I therefore attach hereto a full and complete set of specifications, with only one change from the former, and that being in the thickness of the switchboard.

Very respectfully,

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 9, 1911.

Mr. Jos. W. Milsom,
Melter and Refiner, U. S. Mint,
Denver.

Sir:

I desire to submit the following report on work performed in the Refinery in refining gold bullion by the application of a pulsating current, and to give reasons for the desirability of purchasing for this Refinery the large motor generator set, specifications for which have been submitted.

The bullion used as anodes for this process assayed as follows:

Gold	824	827
Silver	165	161
Base	11	12

These anodes were suspended in five glass cells 12" x 8" x 6" deep, connected in series, each cell containing six anodes and six cathodes. The current used was furnished by a 6 volt, 50 ampere, direct current generator and a 10 volt, 100 ampere, alternating current generator connected in series. The current density at the anode was 55 amperes per square foot, with a cold solution, and 75 to 90 amperes per square foot with electrolyte heated to 65 deg. C.

The gold deposited amounted to 3267 ozs., and assayed 999.8 fine.

The gold found in the slimes from these cells amounted to 2.4% of the gold deposited, whereas the amount of gold in slimes from the direct current process is 10% of the gold deposited.

The advantages offered by this method of refining, as compared with

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

M. & R. - 2

our present method, are numerous. At least 90% of the gold received at this mint could be refined without previous treatment in the silver cells. This would eliminate the melting and handling of at least 350,000 ozs. of gold and silver per month. The gold and silver on hand in the Refinery would be decreased to about one-third of the present amount, which would make it possible to effect a clean-up oftener and in much less time. There would be a considerable saving in the cost of acids, crucibles, fuel, and other supplies, and a reduction in the amount of labor.

The output of gold from the Refinery could be increased at least 50% without increasing the force.

The pulsating current gives a more uniform deposit of gold on the cathodes than the direct current, and the work necessary for preparing cathodes would be reduced about 25%.

I believe the saving on values and cost of operations by the installation of this process would, in less than a year's time, pay for the motor generator set.

Respectfully,

B P Wirth

Foreman of Refinery.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 3, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answering the Director's letter of the 28th ult., relating to No. 80 Mint Special Crucible, I desire first to quote therefrom to wit: "For example, you have furnished a blue print for the No. 80 Crucible which shows no lip, while your recent letters insist that all the numbers shall be supplied with lips. Your specifications for the No. 80 graphite crucible show that the outside diameter at the top is $8\frac{1}{2}$ ", while the greatest outside diameter is 9", which indicates a bilge of $\frac{1}{2}$ ". Moreover, it is thicker at the top than at the bottom, which would seem to be contrary to the accepted rules for crucible construction."

As to the lip, it is wholly immaterial so far as the use of the No. 80 is concerned.

As to the specifications referred to, there is evidently some misunderstanding. The letter says outside diameter, top, $8\frac{1}{2}$ ", and greatest outside diameter, 9"; and I now have before me the original drawing from which the blue-print was made, and it plainly shows the outside diameter, top, $12\frac{1}{8}$ ", and greatest outside diameter, $12\frac{13}{16}$ ", thus making the bilge $\frac{11}{16}$ ", which is correct. In considering the bilge question, it may be well to notice that

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

it is considered only as relating to the top, because, you will observe, that if it was taken in relation to the bottom, the bilge would be $4-13/16$ ".

As to the crucible being thicker at the top than at the bottom, I am quite confident that the original drawing shows just the opposite, because it gives the thickness at the top as 1", and $5-1/2$ " below the top it commences gradually to thicken, scaling $1-3/16$ " at the lower part, and $1-3/8$ " on the bottom at the end of the side, and is marked $1-1/4$ " in center of bottom--the difference of $1/8$ " between the latter figures being accounted for by cupping the bottom of the crucible $1/8$ " so that it will sit level.

Respectfully,

Samuelson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

October 9, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Responding to the Director's letter of the 4th inst., I present a statement of accounts for the fiscal year 1911, showing all items of Refinery costs charged to the Melter and Refiner by the General Department and the Assayer; and as well that portion of the "M. & R. Gen'l" and "Sweeps Cellar" costs chargeable to the Refinery, none of which, so far as I am advised, was paid from the "Parting and Refining Fund," to wit:

"M. & R. Gen'l" - - - - -	\$8,064.38
Sweeps Cellar - - - - -	804.20
Power - - - - -	4,476.34
Fuel Oil - - - - -	1,511.70
Repairs - - - - -	1,895.20
Light and Ventilation - - - - -	1,042.00
Incidentals - - - - -	155.05
Assays - - - - -	2,093.36
New Equipment (work of Gen'l Dept. pertaining to installation, etc.) - - - - -	1,475.87
Total	\$18,547.26

The "M. & R. Gen'l" charge is made up of $\frac{2}{3}$ of the salaries of the Melter and Refiner, Assistant Melter and Refiner, clerk, and one skilled workman in the Make-up room. The "Power" item is the charge for electricity and steam. The "New Equipment" item is the charges of the General Department against Melter and Refiner for installation, etc.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

I believe all of the above items, making a total of \$18,547.25,
are properly chargeable to the Parting and Refining fund.

Respectfully,

John W. Wilson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 17, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering the Director's letter of the 13th inst.:-

It is impossible to ascertain exactly the amount of platinum and palladium recovered during the calendar year 1910, because these metals are returned at the end of the fiscal year, after the Refinery has practically concluded its operations for said fiscal year. However, by working out the percentage based wholly upon crude bullion sent to the Refinery, I find that our recoveries for the calendar year 1910 were as follows:

Platinum,	77.40	Troy ounces
Palladium,	2.40	" "

Respectfully,

Joseph Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 30, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The letter of the Director, of October 26th, and copy of Dr. Tuttle's letter of the 25th inst., accompanying same, both referring to our platinum, have just been handed me for consideration. As I understand the matter, it was not wholly a question as to the purity of our platinum, but partly as to the method of sale. We believed that if the platinum were shipped to a reliable purchaser who would pay for the metal it contained (in the same manner practically as bullion is shipped to and paid for by the Mint), we would receive more money for it than if it was sold on sample; as in the latter event the purchaser would naturally take all the leeway possible to make a large profit. However, our platinum is now refined and ready for sale by sample or otherwise: and in my opinion the samples will be as reliable as any other platinum samples furnished for a like purpose.

Respectfully,

John A. Johnson

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 21, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Referring to the Director's letter of the 10th inst., relating to assay offices reporting on their invoices the deductions for mint charges and the rate of Parting and Refining charges:

I am quite clear on what is desired by the latter, as I formerly reported the crude bullion sent to the Refinery with separate items showing the amount of bullion at the different charges. However, I am at a loss to understand just what connection the deductions for mint charges has to do with the Refinery cost reports. Will you please advise me?

Respectfully,

W. H. H. H. H. H.

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 9, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Upon return from your recent visit to the Philadelphia Mint, you gave me a statement entitled "Making nickel ingots and disposing of the troublesome oxides," which you stated was handed you by Mr. Cobb, foreman of the ingot room of said Mint. It refers wholly to deoxidizing materials, and I am anxious to obtain more definite information regarding the same along the following lines, to wit:

1. Are the manganese copper and silicon copper commercial products that can be purchased with the proper percentage of the respective metals as given in said statement?
2. If they cannot be so purchased, please describe fully the method of making each alloy.
3. In making the final alloy that is put into the crucible, are the manganese copper and silicon copper melted together, and if so, in what proportion?

I shall appreciate your obtaining this information for me at the earliest convenient time.

Respectfully,

J. W. Johnson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 29, 1911.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The Millionaire Calculating machine in this office is out of order, refusing to consistently perform calculations as usual; the difficulty being discovered only this morning.

On the lid it says, "If you want to take the calculating machine to pieces, write for special instructions (Printed pamphlet.)"

I have no doubt that, with this pamphlet before him, Mr. Moessner could adjust the machine or remove the difficulty. The name and address of the agent for the United States is W. A. Morschhauser, 1 Madison Avenue, New York City.

Respectfully,

John Wilson
Melter and Refiner

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 8, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering the Director's letter of the 3d inst.:

This department operated upon bronze coinage metal during the fiscal year ended June 30, 1911, as follows:

Delivered to Melters	<u>313,991.45</u>
Returned by Melters in Ingots	302,173.50
Delivered to Superintendent in Ingots	<u>302,167.65</u>
Loss in weight, by drying out, between making, and delivering	5.85

Respectfully,

Foran
Melter and Refiner.

Mint of the United States at Denver.

January 8, 1912.

To All Employees in the Melter and Refiner's Department:

I have this day been requested by the Superintendent to inform you "that during the calendar year 1912 it is intended to arrange, so far as practicable, so that the workmen in the several departments shall take their regular annual leave at the same time. This applies more especially to the employees in the Melter & Refiner's and Coiner's Departments."

It is the purpose of the Superintendent, "about the time of the annual settlement, which will probably occur the latter part of June, to suspend operations in the two departments mentioned for a sufficient length of time to exhaust all annual leave. The Rules provide that employees of the Mint & Assay Service may be granted thirty days' annual leave during each calendar year, where the granting of such leave will not be detrimental to the interests of the Government. Requests for leave during the first six months of the calendar year should be made with the knowledge that, if such leave is granted, the employee who receives such leave may be required, during the shut-down, to be off duty without pay for some days or weeks."

It is the desire of the Superintendent "that all of the employees of this Mint shall receive thirty days' annual leave, and this notice is given at this time so that satisfactory arrangements may be made to that end."

Respectfully,

For Commissioner
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 15, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Twice within the last year I have made the request that I be supplied with a requisition book, but it has not been furnished, and I now have only five blank requisitions on hand. I think perhaps the book was not sent on account of the contemplated change to the storehouse system, as I received a lot of storehouse order blanks (with carbon duplicator) some time ago. But as I understand the storehouse system will not be established in this institution, and the order blanks referred to are useless for any other system, I most earnestly request that I be supplied, as soon as possible, with a book of the old form of requisitions, viz: "U. S. Mint Service, Form No. 492 E." a sample of which I enclose herewith.

Respectfully,

Belmont
Melter and Refiner.

Supt. declined to forward,

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

February 26, 1912.

Hon. Frank M. Downer,
 Superintendent, U. S. Mint,
 Denver.

Sir:

The crucible data requested by the Director in his letter of the 15th inst. is submitted in the statement following:

Graphite Crucibles used in the M. & R. Department, Denver Mint,
 July 1, 1911, to Dec. 31, 1911.

Size	Cost each	No. used	Bullion Melted			Total
			Gold	Silver	Other	
Ref'y #80	\$3.456	62	1,434,546.76	1,575,855.00	129,579.90	3,139,981.66
Ingot #80	do	43	none	2,164,150.41	34,300.00	2,198,450.41
do #80	do	58			*1754,988.85	1,754,988.85
Totals		163	1,434,546.76	3,740,005.41	1918,868.75	7,093,420.92

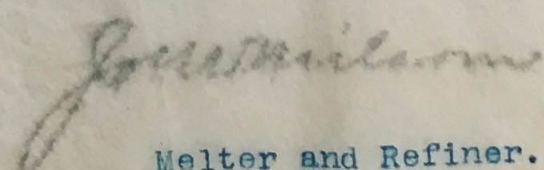
* Bronze work

Number of crucibles on hand January 1, 1912:

Bartley	No. 80,	Mint Special	473
Gautier	"	"	84
Dixon	"	"	12
Total			569

Additional information on this subject may be obtained from my letter to you under date of May 5, 1911, which covers practically the same ground for a period of ten months.

Respectfully,



Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT

February 28, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I present the following in response to the Director's letter of the 14th inst.:

In 1905 we prepared specifications for a graphite crucible which we designated "No. 70 Mint Special," and with slight changes it is the same crucible we continue to specify when calling for bids on crucibles. Originally, the bids were submitted at a specific price for each crucible, but later the manufacturers changed their method of bidding to a price per number; and, owing to the fact that our "No. 70 Mint Special" was larger than a regular No. 80, they submitted their bids to us on the same specifications, but designated it "No. 80 Mint Special," which latter designation we accepted as satisfactory, and it still obtains. A comparison of dimensions is interesting, and so I will insert it here.

	Height Outside	Depth In- side	Diam. Top Out- side	Diam. Top In- side	Diam. Bilge Out- side	Diam. Bottom Out- side	Wt. Av. lbs.	Capacity Gal. Qt. Pt.		
Dixon, #80 Regular	15-1/8		11-1/4		12-3/8	8-1/2		3	2	1
" 100 "	16-1/8		11-7/8		13-1/8	9-1/4		4	2	1
" 80 Mint Sp.	16-7/8	15-1/4	12	9-3/4	12-5/8	8	41-1/2	4	3	1 1/2
Gautier 80 " "	16-7/8	15-3/8	12-1/4	10	13	8-1/8	44-1/2	4	3	1 3/4
Bartley 80 " "	17	15-1/2	12-1/2	10-3/8	13	8	42-1/2	5	1	1
N.Y. #70 Special	16-5/8	15-1/4	11-3/4	9-1/8	12-1/4	8-3/4				

The "number" of our "specials" has little relation to the same number on regular makes; and to show this clearly I inserted in the

MINT OF THE UNITED STATES AT DENVER,

Superintendent - 2

MELTER AND REFINER'S DEPARTMENT,

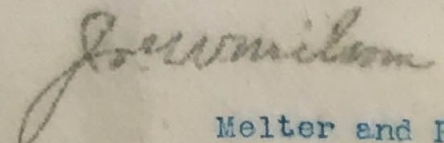
above list the dimensions of the Dixon Nos. 80 and 100 regular size (in so far as I could obtain them from the Dixon publication, "Crucibles, their care and use"), and an examination of the said table will show that all of our "No. 80 Specials" are larger than the Dixon No. 100 regular make; and in fact the holding capacity, liquid measure, is about the same as the Dixon No. 125 regular.

We submitted practically the same specifications to the Dixon, Gaultier, and Bartley companies, and the differences in sizes shown between their crucibles is due to the manufacturers' variance from said specifications. The New York No. 70 Special is a little smaller than our No. 80 Special in every measurement, except outside diameter of bottom, theirs being 8-3/4 inches and ours 8 inches; originally, ours was 8-1/2 inches, but we believed we could get a better application of heat to the crucible by having more flare near the bottom, so we reduced it to 8 inches, and are satisfied with the result. Our furnaces would take the New York No. 70 Special, but its dimensions so nearly corresponds to our No. 80 Special that a trial by us would probably not determine anything of value.

As to the suggestions regarding the No. 80 Special of Bartley make, the test of its use will be made in the ordinary run of our work, as the "Bartley No. 80 Special" was made from our specifications, and we have more than 400 of them on hand.

I do not believe it would be economical to use a larger crucible in our work, even aside from the fact that, if we did, it would require new furnaces.

Respectfully,



Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 1, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank books and form for the use of the Melter and Refiner's Department during the next ensuing fiscal year.

Form No.	On Hand	No. Wanted	
184	1	6	M. & R.'s Record of Silver Ingot Melting
871	0	4	Refinery Gold Account
✓ 4/23 889	60	300	M. & R.'s Daily Balance

Respectfully,

Joe W. Miller
Melter and Refiner

Samples attached

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

April 1, 1912.

Mr. Jos. W. Milsom,

Melter and Refiner, U. S. Mint,

Denver.

Sir:

The following is a report on work performed in the Refinery of this Mint during the past three weeks, to establish a system of weighing and checking the amount of gold on hand.

We endeavored to perform this work in such a way that it would not interfere with the regular operations of the Refinery, or shut down either gold or silver system for any great length of time. The work was accomplished by a shut-down on the silver cells of four hours per cell. The eight cells were checked singly, the current in the meantime performing the work in the remaining seven. The electrolyte was removed, and all gold taken from these cells was melted, weighed, and assayed. All gold used for mechanical purposes, such as strips and hangers, was weighed, assayed, and numbered on each cell, so that in the future this gold can be checked by the number without removing and weighing it.

The gold cells were shut down twenty hours. The gold strips were treated the same as on the silver system. The remaining gold was removed, and the cells were put into operation with new anodes and cathodes that had been weighed and assayed. The anodes, cathodes, slimes, and electrolyte were removed from the cells, all gold in solution reduced to the metallic state,

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

M. & R. - 2

and then melted, weighed, and assayed.

As shown by the accompanying statement, the amount of gold found in the Refinery by actual weight was 1,084.768 standard ounces less than the amount charged. There are at present approximately eight and one-half tons of untreated Refinery sweeps. Estimating these sweeps on the same basis as Lot No. 2, namely, 62 ounces per ton, we could recover 527 standard ounces from the eight and one-half tons. This would leave a balance of 557.768 standard ounces.

This amount would have to be recovered from the four melting furnaces, which have been in use for two months, from the flues, settling chamber, sand in gold hood, and the burning of all wood frames, filter plates, etc.

With the amount of sweeps at present on hand, it is difficult to obtain a fair estimate either as to the weight or the gold contents of the same. The treatment of these sweeps for the recovery of values at the time that the check is made in the Refinery would, I believe, give far more satisfactory results.

Respectfully,

B. P. Wirth

Foreman of Refinery.

APR 152

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 1, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I transmit herewith a report made to me by the Foreman of the Refinery regarding a method of checking the Refinery from time to time; and accompanying the same is a statement of the bullion in the Refinery, showing a deficit of 1,084.768 standard ounces of gold, which would have to be recovered from sweeps, furnaces, and flues, settling chamber, gold cells hood, etc.

If we had any way of determining the values in the sweeps, the statement would be much more satisfactory, as I am confident they contain more than 527 standard ounces; but, owing to the amount of work in the sweeps cellar, it was impossible to secure the treatment of the Refinery sweeps in time for this statement.

Respectfully,

J. C. Wilson
Melter and Refiner.

Per
153

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

M. & R. - 2

and then melted, weighed, and assayed.

As shown by the accompanying statement, the amount of gold found in the Refinery by actual weight was 1,182.555 standard ounces less than the amount charged. There are at present approximately eight and one-half tons of untreated Refinery sweeps. Estimating these sweeps on the same basis as Lot No. 2, namely, 62 ounces per ton, we could recover 527 standard ounces from the eight and one-half tons. This would leave a balance of 655.555 standard ounces.

This amount would have to be recovered from the four melting furnaces, which have been in use for two months, from the flues, settling chamber, sand in gold hood, and the burning of all wood frames, filter plates, etc.

With the amount of sweeps at present on hand, it is difficult to obtain a fair estimate either as to the weight or the gold contents of the same. The treatment of these sweeps for the recovery of values at the time that the check is made in the Refinery would, I believe, give far more satisfactory results.

Respectfully,

B. P. Wirth

Foreman of Refinery.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 3, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I transmit herewith a report made to me by the Foreman of the Refinery regarding a method of checking the Refinery from time to time; and accompanying the same is a statement of the bullion in the Refinery, showing a deficit of 1,182.555 standard ounces of gold, which would have to be recovered from sweeps, furnaces, flues, settling chamber, gold cells hood, etc.

If we had any way of determining the values in the sweeps, the statement would be much more satisfactory, as I am confident they contain more than 527 standard ounces; but, owing to the amount of work in the sweeps cellar, it was impossible to secure the treatment of the Refinery sweeps in time for this statement.

We can make this check five or six times a year, and by timely treatment of the sweeps and rebuilding our furnaces approximately every two months (which is the ordinary life of a furnace in the Refinery), we can get a much closer check than is indicated by the results just obtained in our initial effort.

The benefit of making the check by the method we have pursued is not alone in ascertaining the amount of gold in the Refinery, but in doing it in such a way as to interfere very slightly with the regular operations of refinery work.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT.

Superintendent - 2

The check was commenced by cleaning out the silver cells one at a time, so that seven were operating while one was shut down; the gold taken from the cells does not figure in getting our balance (as it is accounted for later in gold anodes, experimental bars, etc., made therefrom), except as to the gold strips and hangers which are numbered by cells, weighed carefully, and a record made of the same, so that for future checks that part of the work will not have to be done over again; but after these cells are cleaned out, they are recharged in the regular way and an accurate account kept of the gold that is put into each one. From 24 to 36 hours before we shut down any of the gold cells, we thoroughly clean out the four cells in which the gold electrolyte is made, and then recharge them for the making of new electrolyte, the old electrolyte on hand being used to keep the gold cells in operation until shut down for clean-out; the amount of gold at this time put into the electrolyte cells is accurately determined and recorded.

We close down eight of the gold cells at a time, and continue operations on the other eight. After they are thoroughly cleaned, we recharge them, having taken account of the strips and hangers as on the silver cells, and we keep an accurate account of the amount of gold used in recharging the gold cells.

On the day we complete our check, we credit the refinery with the amount of gold in the gold electrolyte, as determined by the amount put into the electrolyte cells, with the amount in the

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

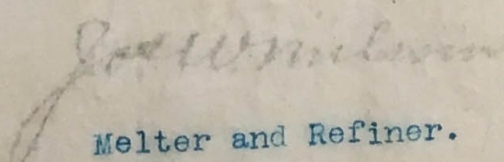
Superintendent - 3

silver cells and gold cells, as taken from the record of the amount put into those cells, respectively, after they were cleaned out, and with all other metal on hand in the Refinery, and also the amount of all assay chips on refinery metal for which the Assayer settles directly with the Melter and Refiner, and with all values contained in tailings from refinery sweeps that have been sold.

This check averaged four hours' time to each silver cell and one and one-quarter hours to each gold cell; but the next check can be made in about one-half that time, and be completed in from four to six days, and with less interference with regular operations as we shall hereafter clean the gold cells one at a time the same as we did the silver cells this time.

I am confident that this system can be perfected so as to show very closely, and at comparatively small expense, the refinery balance at any time desired; and making this kind of a check every month or two will practically eliminate that haunting fear about refinery conditions that has always existed because we had to wait until the end of the year to know how we stood.

Respectfully,


Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Crucible Data, 1911 - 2

and only 29 for 608 silver anode melts, 12 for 278 melts of gold from silver cells, etc. But in all these instances, the secondary use of crucibles (having first been used for fine metal melts) fully explains the matter.

As the size of crucibles has a bearing on the foregoing figures, it may be well to consider the following table of comparative dimensions:

	Height Outside	Depth In- side	Diam. Top Out- side	Diam. Top In- side	Diam. Bilge Out- side	Diam. Bot'm Out- side	Wt. Av. Lbs.	Capacity G.Q.Pt.
Dixon, #80 Regular	15-1/8		11-1/4		12-3/8	8-1/2		3 2 1
" 100 "	16-1/8		11-7/8		13-1/8	9-1/4		4 2 1
" 80 Mint Sp.	16-7/8	15-1/4	12	9-3/4	12-5/8	8	41-1/2	4 3 1/2
Gautier 80 " "	16-7/8	15-3/8	12-1/4	10	13	8-1/8	44-1/2	4 3 1-2/3
Bartley 80 " "	17	15-1/2	12-1/2	10-3/8	13	8	42-1/2	5 1 1
N.Y. #70 Special	16-5/8	15-1/4	11-3/4	9-1/8	12-1/4	8-3/4		

The "number" of our "specials" has little relation to the same number of regular makes; and to show this clearly I inserted in the above list the dimensions of the Dixon Nos. 80 and 100, regular size, and therefrom it will be observed that all of our "No. 80 Specials" are larger than the Dixon No. 100 regular make; in fact, the holding capacity, liquid measure, is approximately the same as the Dixon No. 125, regular.

We submitted practically the same specifications to the Dixon, Gautier, and Bartley companies; and the difference in dimensions shown between their crucibles is wholly due to the manufacturers' variance from said specifications.

Our smallest "No. 80 Special" (the Dixon) is larger than the

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Crucible Data, 1911 - 3

"N.Y. No. 70 Special" in every measurement, except outside diameter of bottom, the N.Y. being 8-3/4 inches, and ours 8 inches; originally ours was 8-1/2 inches in this measurement, but we believed we could get a better application of heat to the crucible by having more flare near the bottom; so we reduced it to 8 inches, and are satisfied with the result.

I do not believe it would be economical to use a larger crucible in our work, even aside from the fact that, if we did, it would require new and larger furnaces.

May 13, 1912.

Samuel
Melter and Refiner, Denver Mint.

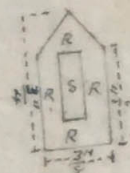
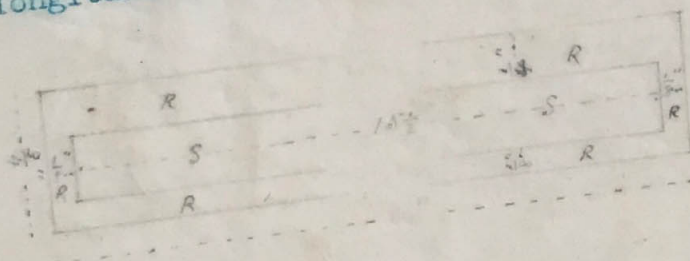
MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 21, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I hereby request the purchase for the use of our gold cells in the Refinery of 350 hard rubber rods, with $1/8"$ x $3/8"$ steel rib running through the center, closed at each end with the rubber so that no part of the rib is exposed, and of the dimensions shown by the following diagram of the transverse and longitudinal section, to wit:



R = Rubber
S = Steel

Heretofore we have purchased these rods from The American Hard Rubber Co., 9 Mercer St., New York, and I do not know of any other firm from which they can be obtained.

Respectfully,

John W. ...
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 24, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I recommend that bids be requested from the Rockwell Engineering Company, of 26 Cortland St., New York, on,

1st. Complete top, including door, for Rockwell Melting furnace, No. M 406;

2nd. Top for said furnace, excluding door.

The above company furnished us this class of furnace for our original equipment, as well as an additional one in March, 1907; and as a number of the tops have burned out, we need from four to six new tops immediately.

Respectfully,

Frederick Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER.
MELTER AND REFINER'S DEPARTMENT.

June 26, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to that part of the Director's letter of the 19th inst., which relates to the Melter and Refiner's department, I will first state that the "No. 80 Special" graphite crucible is the only crucible used in my department.

I find it good practice to thoroughly stir all gold melts, and shall continue to do so, as it frequently saves remelting (even of fine gold), and remelting is expensive in labor, fuel, and loss of metal.

I desire a crucible that will hold 7500 ozs. of fine gold and still have sufficient room to safely stir the same; and I am of the opinion that the "No. 80 Special" as bid on by Gaudier or Bartley will be all right as to size. However, it might be pertinent to insert here that in the latter part of May the Ingot room found a bad lot of Bartley crucibles, to wit: May 20th, a crucible made two melts and went through on the third; May 23d, one made one melt and leaked on the second; May 24th, one cracked on the first melt, and another made four melts and went through; and on May 29th, one made three melts and went through on the fourth -- all on nickel ingots.

In so far as it relates to this mint, the "No. 70 Special"

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

should be eliminated entirely. The rings for the "No. 80 Special" should be 9-1/2 inches in diameter on the inside (if the crucible is 9-3/4" as specified), so as to be just a little smaller than the inside top diameter of the crucible; they should have an outside diameter of 11-1/2 to 12 inches.

As to the said inside diameter of the ring, it must not be greater than the inside diameter of the crucible; because, if it is, small particles of gold (or other metal) will lodge on the top edge of the crucible. In fact, the best size of ring is one that will project over the inside of the crucible about 1/8 of an inch all around, thus making the diameter of the inside of the ring 1/4 of an inch less than the inside diameter of the top of crucible as hereinbefore stated. I do not think the No. 70 ring will be suitable for the "No. 80 Special" crucible, as specified by the Bureau.

Respectfully,

Joe W. Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER
MELTER AND REFINER'S DEPARTMENT

July 3, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

My annual settlement statement as Melter and Refiner of the Denver Mint, for the fiscal year 1912, disclosed that the Refinery had a wastage of 269.299 standard ozs. of gold and 2,048.78 standard ozs. of silver. The Ingot room had a surplus of 201.646 standard ozs. of gold and a wastage of 798.06 standard ozs. of silver. The Assayer returned a gold surplus of 17.839 standard ozs., and showed a wastage in silver of 7.11 standard ozs.

The silver wastage in the Ingot room was normal, being less than one-quarter of an ounce on each thousand ounces operated upon. The gold surplus in the Ingot room was abnormal. At the close of the fiscal year, 1911, we made a most thorough clean-up of the Ingot room, by chipping and scraping the stacks, tearing out and relining the flue chambers, rebuilding all furnaces, rebuilding the settling chamber, and even scraping the floor and fixtures with wire brushes; and during the fiscal year just ended we did not operate on any gold in any form in the Ingot room, except a few Refinery sweets in making the Refinery clean-up after last year's settlement. Yet we recovered gold as follows:

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

From Silver Ingot kings (sweats of charcoal and floor sweepings) - - - - -	48,337 ozs.
From Sweeps (crucibles, furnace brick, and slag from sweats) - - - - -	138,346 "
From clean-up (flues, stacks, and settling chamber) - - - - -	14,963 "
Total	201,646 "

It is my opinion that in some way most of this must have come from the Refinery operations, particularly as to the sweeps recoveries: because the first lot of Ingot sweeps yielded 106.866 ozs. of gold, and I know of no way that that would have been possible except through a mix-up of Refinery and Ingot sweeps (which might have happened in this way: The bins of the Refinery and Ingot room sweeps are side by side, a board partition separating them; and the men taking sweeps to the sweeps cellar may have inadvertently put them in the wrong bin). At least that amount of the Ingot sweeps recoveries belongs to the Refinery.

The Assayer's surplus in gold was obtained from fractional gains in weighing chips.

The loss of silver in the Refinery was largely due to melting it over and over again in alloying anode melts for the silver cells; and the gold certificate bars for the year contained 671.91 standard ozs. of silver which was, of course, that much of a loss to the Refinery.

As to the Refinery gold wastage: Prior to August 1st, 1910, gold was reported by the Assayer to the half-point, and since that

MINT OF THE UNITED STATES AT DENVER

MELTER AND REFINER'S DEPARTMENT

Superintendent - 3

date to the quarter-point. So in the last fiscal year (1911) we had all of the 1910 settlement bullion, as well as the July, 1910, receipts, that had been reported to the half-point; but during the year just ended, all bullion operated upon had been assayed to the quarter-point.

In the past year we made 57 gold anode melts, and the loss on these melts, being the difference between the actual make-up fineness and the Assayer's reported fineness, was - - - 123.810 ozs.

Same nature of loss on 3 special gold melts - - 3.875 "

Actual loss in weight of deposits (charged in full to Refinery) - - - 20.952 "

Loss in sweeps mix-up (as shown by Ingot sweeps, Lot No. 1 - - - 106.868 "

Total 255.484 "

We had assays on only three special gold melts out of 34; but if the other 31 melts had lost in proportion, it would make an additional loss of 42.770 ozs. In preparing our bullion for the settlement commission, we massed the grains from bars on hand, and found a loss thereon of 11.373 ozs.; and I believe this proportion held good throughout the year, and if it did it would make a considerable increase in actual loss to the Refinery. And in addition, there is still 31.480 ozs. of gold in Ingot room sweeps unaccounted for.

My department loss in gold, 81.372 ozs., is 81.559 ozs. in excess of the difference between the Assayer's and the Ingot room

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 4

grains and the Refinery loss; and that is accounted for by the loss on grains and mass melts delivered in settlement.

This is the first time in the history of this Mint that my department has had a gold deficit, and the foregoing statement explains what caused it this year.

Respectfully,

John W. Wilson
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 9th, 1912.

Hon. Frank M. Downer,
Supt., U. S. Mint,
Denver, Colorado.

Sir:

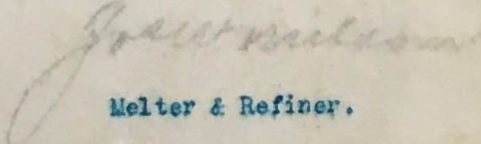
Answering the Director's letter of the 25th ult:-

I did not retain a copy of the special dimensions of the #80 crucible given to Miss Kelly when she was here, but I remember very clearly that I slightly decreased the size of the Bartley #80 as forwarded us in 1912, and I believe the specifications upon which the Bureau called for bids, to-wit: Height outside 16-7/8", Depth inside 15-3/8", Diameter top outside 12", Diameter top inside 9-3/4", Bilge outside 12-13/16", Bilge inside 10-9/16", Diameter bottom outside 8" and capacity 4 gal. 3 qts. , closely approximates the dimensions given Miss Kelly.

I am quite positive that there is not sufficient difference between the dimensions as given Miss Kelly and the No. 80 we now use to be of any particular advantage, and considering the fact that the latter may be purchased at a saving of fifteen cents per crucible, I recommend that no change be made from our present size, which as you know is entirely satisfactory to us in every way.

In preparing the specifications given Miss Kelly I had in mind a slight reduction in size without any decrease in weight, which would probably cover the suggestion of Mr. Coleman as to thickness; however, the difference in weight could only make a thin film in thickness over all the crucible, in my opinion hardly sufficient to be considered as a factor of any importance in the life of the crucible.

Respectfully,


Melter & Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 17, 1912.

Mr. J. Wilber Yeats,
Philadelphia, Pa.

My dear Mr. Yeats:

It is a pleasure to answer yours of the 10th inst. as I want you to have a complete understanding of everything pertaining to my annual settlement report:-

On page 2 of my letter accompanying the settlement statement, I show a gold recovery from Ingot sweeps tailings of 138.346 ozs., and on page 3 I gave the Refinery credit with the gold recovered from Ingot sweeps tailings Lot. No. 1 amounting to 106.866 ozs., which amount being deducted from the total recovered from Ingot sweeps tailings leaves a balance of 31.480 ozs. gold recovered from said tailings, which might have been credited to the Refinery (as the Ingot Room did not operate on any gold during the year) but was not so credited and therefore its actual source is "unaccounted for."

The reason why the wastages and surplus in gold and silver of the different departments, when combined, does not equal the net wastage or surplus of my department as a whole is explained in a general way, as to the gold, in the closing part of my said letter, but I will now present it in detail:

First, as to the increase in gold wastage; the combined surplus of the Ingot Room and Assayer was 219.485 ozs., and the Refinery wastage was 269.299 ozs. showing an apparent wastage of only 49.814 ozs., yet my statement shows a total wastage of 81.372 ozs; an increase of 31.558 ozs. which is accounted for as follows:-

In making 3 mass melts of 215 small bars for settlement, the resulting melts showed an actual loss of	17.181 ozs.
In massing grains for settlement we made an actual loss of	11.373 "
Loss in weight of certificate bars for the year	1.786 "
Loss in remelting 11 certificate bars chipped by 1911	
Settlement Commission	1.391 "
making a total loss (with which individual departments had no connection) which approximately balances the increase in gold wastage.	31.731 "

Second, as to the decrease in silver wastage:

The combined wastage of the Refinery, Ingot Room and Assayer was 2,853.90 ozs., yet my settlement statement shows a net wastage of only 918.24 ozs. representing a department gain as against the combined loss of 1935.66 ozs.

The silver ingot melts are always "made up" to a fineness of .899, and, on account of the segregation of the silver, that mixture produces coins of standard fineness; but the Ingot Room is of course charged with the (.899) melts as of standard fineness, so the M & R Department actually gains in the first instance one ounce in each thousand on the weight of all silver bars used in making silver ingot melts, but against this gain, the clippings returned by the Coiner are quite a little below standard on account of said segregation and must be fined up when put into the melts, and the excess of silver used for such purpose (by a reduction in the amount of alloy copper, which is actually the way we do it) is a loss charged against the aforesaid gain, the difference being the actual net gain to the M & R Department.

To illustrate in detail:

I delivered to the Ingot Room melters during the year	3,325,410.35 ozs.
of which the clippings, etc. amounted to	1,110,103.95 "
the difference (.889 fine but charged at .900 to Ingot Room)	2,215,306.40 "
Thus making the gain at one ounce in the thousand	2,215.30 "
Subtract from this the amount of alloy copper deducted to	
fine up clippings	313.00 "
making a net gain on ingot melts of	1,902.30 "
and adding thereto the silver gain on Settlement Mass Melts of	34.38 "
makes a net gain (with which individual departments have no	
connection) of	1,936.68 "

which very closely approximates the difference shown above, particularly when you take into consideration that I did not calculate the silver differences on grains massed for settlement, which might have made a slight difference either way.

Very truly yours,

Melter & Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 19, 1912.

Hon. F. M. Downer,
Supt., U. S. Mint,
Denver, Colorado.

Sir:

Answering the Director's letter of the 16th
inst., relating to slimes:-

Owing to the fact that our supply of fine gold
bullion is so limited as to frequently be insufficient
for making the necessary amount of gold chloride for
the electrolyte in our gold cells, we treat the slimes
in such a way that enables us to use all the gold con-
tents in the making of gold chloride; our method of
treating them is as follows:-

After a thorough washing we run them through
the press and then melt them, and after skimming off
the silver chloride we pour the gold into anodes for
the gold chloride cells, and the silver chloride is
ground up in a small roller mill and the silver reduced
with zinc.

The gold slimes as they come from the cells
contain about 600 parts of gold, and the anodes made
therefrom are from 950 to 970 fine.

If the character of our bullion would permit, or
if we were using the pulsating current, we would probably
put all our gold slimes through the silver cells.

Respectfully,

John W. Milson
Melter & Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

July 22nd, 1912.

Hon. F. M. Downer,
Supt., U. S. Mint,
Denver, Colorado.

Sir:

Answering the Director's letter of the 19th
Inst:-

When I turn over a melt of gold (certificate bars or other) I do not make an allowance to the Superintendent to cover any variance between the weight of the melt by individual bars and the weight of the mass melt, but cover the difference in this way:- When a melt is received from the refinery, the latter is credited with the mass weight of the melt, which is then turned over to the Superintendent, and after each bar is weighed individually and calculated, the Superintendent receipts to me for the aggregate of the individual bars, and I take credit with the same, and the loss on 203 melts of certificate bars during the fiscal year ended June 30th, 1912, was 1.786 ounces.

So, instead of making a fixed allowance, which could only be approximated, my method allows for the actual difference, no more, no less.

Respectfully,

James Wilson
Melter & Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 27, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to that part of the Director's letter of the 18th inst., relating to the M. & R.'s department, and regarding the advisability of making changes in forms now in use, I respectfully attach hereto M. & R. Settlement Form 900, with such changes as I think advisable noted thereon. On each margin of said form I have numbered the lines solely for the purpose of reference in the following statement of my reasons for the changes suggested.

First as to the debit side:

- Line 1. Ingots are never redelivered to the M. & R. after settlement as the Superintendent always turns them over to the Coiner; so strike out the word "Ingot."
- Line 2. Move up one line.
- Line 3. Move up one line.
- Line 16. The word "Proof" should be stricken out, as that line should include all re-delivery to the Assayer without the same being itemized. It is at least peculiar to use six lines to itemize a small redelivery and only one line (22) to account for a whole year's regular work (as provided on the present form.
- Line 17. "Regular delivery during year" should be printed on that line.
- Line 20. Strike out "Bars," as we never deliver bars to the Assayer except proof metal; and the word "Proof" should be printed on this line.
- Line 21. Strike out "Coin samples," as the M. & R. has no connection with such item; and on this line print the word "Surplus," which is quite necessary and is not provided for in the present form.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

- Line 22. Strike out the words, "Regular delivery," as we have properly provided for that on line 17.
- Line 30. As I understand the Bureau prefers a division of the bullion retreated by the Refinery, this line might have added to it, "Mint fine bars," but that is not essential as those words can be written in, and if they were printed it might not fit conditions in other Mints.
- Line 31. The words "Bullion for mechanical use" should be stricken out, because if there is any such item (there never is in this mint), it should be previously included in the redelivery of settlement bullion on line 25. The words "slimes bars" could be written in on this line, but the words "Bullion retreated" should be printed, thus giving us two lines (30 and 31) under the heading "Bullion retreated," which would enable us to make the necessary division of kind.
- Line 41. The word "Surplus" should be printed on that line, as we have found it necessary to use it a number of times.
- Line 44. Strike out "bbls." It is very indefinite and does not represent any fixed weight; in place thereof insert the abbreviation for pounds, "lbs."
- Line 45. Same as 44.
- Line 46. Same as 44.
- Line 57. After the word "Redelivery," strike out the word "Ingot," as the Superintendent never redelivers ingots to the M. & R. but always delivers them to the Coiner. On that line, in place of the word "Ingot," print the word "Clippings."
- Line 58. Strike out "Clippings," and print "Condemned coin and blanks."
- Line 59. Strike out "Condemned coin and blanks."
- Line 60. Move up one line.
- Line 61. " " " "
- Line 62. " " " "
- Line 63. " " " " and strike out "shot" before nickel; we use the cube.
- Line 64. Move up one line.
- Line 65. " " " "

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT.

Superintendent - 3

- Line 66. Leave blank, so that it can be filled in as necessary (see 1912 report).
- Line 68. Print as shown on form, and as requested by Bureau; however, I think its proper place on blank would be to follow the general account of the M. & R.'s department, that is, immediately after line 14.

Secondly, as to the credit side:

- Line 2. After the word "Bars" print "Certificate," and on
- Line 3. " " " " " " "Commercial."
- Line 13. Rule the bottom of this line heavy (as I have indicated with red ink), so that the addition of the wastage to the total returned will give a final total to correspond with the debit side of total received, and thus show an exact balance. (See 1912 report.)
- Line 14. Print on this line the word "Total."
- Line 17. Strike out the words "Deposit Chips" and insert "Alloy silver." The Assayer settles with the M. & R. for deposit chips and bar samples(with bars) prior to settlement with the Commission.
- Line 19. Strike out "Bar samples" and print in "Sweeps."
- Line 21. Print in the word "Wastage."
- Line 26. On this line the word "Slimes" might be printed, but it is not really necessary as it can be written as well.
- Line 27. The word "Bars" should be printed in, following the words "Returned at settlement," as we always have the bars.
- Line 28. Print in the words "Assay chips for the year."
- Line 29. Print in the words "Sweeps prior to settlement."
- Line 30. Print in the words "Sweeps at settlement."
- Line 35. Print at end of line an additional item, to wit: "Palladium
ozs."
- Line 38. Strike out "Returned at settlement, Ingots," because the ingot room returns all its ingots prior to settlement, in fact at close of each day; print on same line "Tops, bars, etc."

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 4

- Line 39. Strike out the word "Chips," as it has no place in Ingot room settlement; in fact, the Ingot room does not return anything at settlement other than sweeps, as its returns are completed each day on all other items. Print on this line "Sweeps, Ingot kings, and clean-up."
- Line 40. After the word "Sweeps" print the additional words "at settlement."
- Line 44. Print in the word "Bars," as that is the form in which the metal recovered from the sweeps is always returned.
- Line 45. Same as 44.
- Line 46. " " "
- Line 47. On the left of line print the word "Tailings"; near the right end of line print the abbreviation "lbs." as shown on form.

In this Mint the Sweeps cellar is under the supervision of the Superintendent, but I will explain how I think the report should be made on this form 900:

The debit side should show the number of pounds of sweeps from each department sent to the Sweeps cellar, the metallic contents thereof to be determined from the credit items which is the only way it can be done, as we have no method by which the sweeps can be sampled before being treated in the mill. The credit items on lines 44, 45, and 46 show the number of standard ozs. of metal recovered from the sweeps through the mill and amalgamating processes, and on line 47 the total number of pounds of tailings and their determined contents show the amount of metal contained in the tailings when they are sold. By this method the original contents of the tailings will be shown, and as well the exact amount of metals extracted in the Sweeps cellar operations.

Line 63. Print in the words "Copper, Tin, and Zinc."

Line 64. Print in the words "Copper and Nickel."

MINT OF THE UNITED STATES AT DENVER,

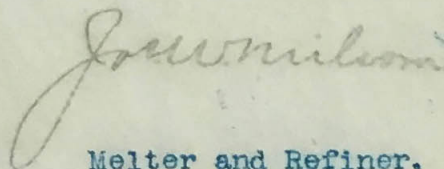
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 5

In the last two lines, 63 and 64, the items referred to will always appear and should be printed (see 1912 report).

If the foregoing changes are made on Form 900, it will be perfectly adapted to the use of the Melter and Refiner in this Mint, and, although unfamiliar with the methods in other Mints, I cannot conceive any reason why it would not be equally suitable to their use.

Respectfully,



Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 2, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering the Director's letter of the July 15th, and memorandum with blueprints of crucibles, under date of July 18:

I have carefully examined the blueprints of the "Denver 80" and the "Specification 80" and I am positively convinced that the latter is the better crucibles, as its capacity is sufficient for all our purposes; and in reducing the size of the "Denver 80" at the request of Miss Kelly when she was here in May last, I purposely increased the thickness of the "Specification 80," and that will add to its durability, thus making for economy; so I earnestly recommend its adoption.

I do not, and have no way of obtaining, the exact size of the Dixon #80 rings, so I cannot say whether or not they will fit the "Specification 80" crucible; but I do know that the rings to fit the said "Specification 80" should be 9-1/2 inches in diameter on the inside, because the inside top diameter of the said crucible is 9-3/4 inches, and the ring should project over the inside top of the crucible a little -- just enough to prevent particles of metal from falling on the top edge of the crucible; and I think the size suggested (that is, a projection of 1/8 inch all around the inside) is right.

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MELTER AND REFINER'S DEPARTMENT,

As to the other graphite articles referred to in said letter, we use the plungers, dipping cups, and rings.

As to the plunger (or gold stirrer), I enclose a blueprint of actual size and showing bottom formation.

As to the rings: diameter outside, 12 inches; inside, 9-1/2 inches. Height of two-inch rings, 3 inches

" " four-inch " 4 "

The dimensions of the dipping cups we are using at the present time are as follows:

	No. 3	No. 4
Height outside	5 inches	5-1/4 inches
Depth inside	4-1/4	4-1/2
Diameter bottom	4	4-1/8
Thickness of sides	1/2	9/16
Length of sides of triangular top, inside	4-1/8	4-5/8
Same, outside	5-1/4	5-3/4
Weight, Troy ozs.	30.55	31.73
Capacity, fluid ozs.	22	28

The dipping cups are "Bartley" and they vary much more than they should; one set of weighings giving No. 3, 30 ozs. and No. 4, 31-1/2 ozs; another set of weighings, made by myself this a.m., gave No. 3, 31.11 ozs., and No. 4, 31.96 ozs.; the figures quoted above being the average.

Respectfully,

J. W. Milner
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 2, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Answering the Director's letter of the 29th ult., regarding oil:
We use "lard oil" for all kinds of ingot work, and it is satisfactory in every way. On nickel ingot work, we mix a little graphite with the lard oil, and it works finely.

As to the oil used in the Philadelphia mint on silver and minor coin and referred to as "mold oil," I am wholly unadvised, and do not know what it is, nor have I been able to find anyone that does. However, as it costs only about one-fifth of the price of lard oil, I should like very much to experiment with it, and for that purpose I recommend the obtaining of not more than one gallon of said "mold oil."

The amount of oil used in the ingot room is very small, the total amount for the last two years (fiscal, 1911 and 1912) being about 13 gallons.

Respectfully,

J. W. Downer

Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 21, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Responding to the Director's letter of the 14th inst., relating to the table of gains and losses on gold anode melts for the fiscal year 1912, I herewith present a supplemental table "showing the number of bars and weight of each bar going into each melt." (The weights given in this table are the book weights, and not the scale weights as given in table to settlement commission.)

I cannot give the loss in melting on any of said melts, as the anodes were not weighed, because we had no scale on which to weigh them until very recently when the New Orleans scale was installed in the Refinery. Since such installation, we weighed the anodes from a few gold melts, but did not make a permanent record of same. We expect in the future to cover this point of loss in melting of gold anode melts.

Respectfully,

J. W. Norton
Melter and Refiner.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 28, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

I hereby appoint Mr. J. M. Hetrich to act in my stead as Superintendent Melting and Refining Department during my absence, commencing today.

Respectfully,

John M. Hetrich

Superintendent Melting and Refining.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

September 9, 1912.

Hon. Frank M. Downen,
Superintendent, U. S. Mint,
Denver.

Sir:

Referring to that portion of the Director's letter of the 4th inst., relating to this department, I beg to submit the following figures for the fiscal year 1912:

Nickel rec'd by M. & R. from Supt.	2,272,508.43
" del'd by M. & R. to Supt.	<u>2,265,541.63</u>
Nickel Wastage	6,966.80
 Bronze rec'd by M. & R. from Supt.	 1,804,524.67
" del'd by M. & R. to Supt.	<u>1,792,818.36</u>
Bronze Wastage	11,706.31

Respectfully,

J. H. Hetrick

Acting Supt. Melting and Refining Dept.

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MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 9, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Referring to that portion of the Director's letter of the 4th inst., relating to this department, I beg to submit the following figures on minor coinage operations for the fiscal year 1912:

NICKEL

Amount delivered by superintendent to M. & R.	2,272,508.43
" returned to " by "	<u>2,265,541.63</u>
Wastage	6,966.80
Amount operated upon	1,234,333.40
Wastage per 1,000 ozs. on amount operated on	5.64

BRONZE

Amount delivered by superintendent to M. & R.	1,804,524.67
" returned to " by "	<u>1,792,818.36</u>
Wastage	11,706.31
Amount operated upon	1,786,110.61
Wastage per 1,000 ozs. on amount operated on	6.55

Respectfully,

J. M. H. H. H.
Acting Supt. Melting and Refining Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

September 17, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for ~~one~~ ^{two} ~~set~~ of Double Eagle
ingot molds. The length and thickness of the ingot should be
the same as in the old set; but the width of the ingot should
be increased from 2-37/64" to 2-19/32".

Respectfully,

J. H. Hatrick
Acting Supt. M. & R. Dept.

*X changed by Supt.
9/18/12*

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 18, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In reply to the Director's letter of the 9th inst., relative to crucibles, rings, and covers, I beg to submit the following:

Changing the wall thickness of the crucible ("Specification 8") from $1\frac{1}{8}$ " to $1\frac{5}{16}$ " decreases the inside top diameter from $9\frac{3}{4}$ " to $9\frac{3}{8}$ ". In his letter to you of August 2, 1912, Mr. Milsom states concerning the relative size of crucible and ring that "the ring should project over the inside top of the crucible a little -- just enough to prevent particles of metal from falling on the top edge of the crucible;" and he therein suggests a projection of $\frac{1}{8}$ " all around the inside, which would make the inside diameter of the ring $\frac{1}{4}$ " less than that of the crucible. So that, with a $9\frac{3}{8}$ " crucible, the ring should be $9\frac{1}{8}$ " inside. If the ring exactly fits the crucible, there is little danger of the metal falling on the top edge; but with 10" Bartley rings as now in use, a ledge of $\frac{5}{16}$ " all around is presented for this undesirable result.

It is earnestly requested that the crucibles be made without the lip shown in the specification. It is necessary to file off the lip so that the quarter-slides will close snugly around the crucible, and filing off so much of the crucible weakens it and materially hastens its deterioration. The Bartley covers will fit the

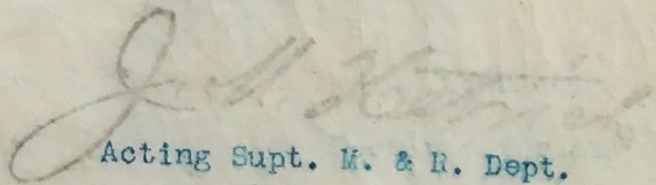
MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - @

crucibles and rings, small or large.

This department will need 500 "Specification 80" crucibles during the present fiscal year, and requisition is hereby made for that number.

Respectfully,



Acting Supt. M. & R. Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 3, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank books and forms for the use of the department of the Superintendent of Melting and Refining, during the ensuing fiscal year:

Form No.	No. on hand	No. wanted	Title
20	0	1	Receipts for Gold Deposits
28	0	1	Receipts for Silver Clippings
185	1	3	M. & R.'s Record of Gold Ingot melting
263	0	3	M. & R.'s Register of Deposits
889	190	150	M. & R.'s Daily Balance
929	400	600	Melts for Parting

Respectfully,

John H. Hetch
Acting Supt. M. & R. Dept.

Samples attached

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 7, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to the Director's letter of the 2d inst.:-

During the fiscal year 1912, we recovered the following by-products:

Copper	573.7 lbs. @ 13¢	\$74.58
Platinum	116.15 ozs. @ \$46.50	5,400.97
Palladium	14.95 " @ 32.50	<u>485.87</u>
	Total value	\$5,961.42

The copper was valued at 13¢. The platinum and palladium prices were obtained from dealers, who stated they were not positive as to the exact prices, but that those quoted would very closely approximate the market values.

Respectfully,

Supt. Melting and Refining Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 17, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The Melting and Refining Department is in need of the following graphite supplies, viz.:

300 - 4 inch rings
200 - 2 " "
200 No. 3 dipping cups
300 " 4 " "
100 No. 80 covers

In the Director's letter of Sept. 15th, we were advised of an increase in the thickness of the walls of the Specification No. 80 Crucibles, but were not advised as to the location of the increase at the top. If it is added on the inside, then the required rings should be 9-1/8" in diameter on the inside; and if it is added on the outside, then the rings should be 9-1/2" inside diameter. The diameter of the cover should be equal to the outside diameter of the top of the crucible, if the crucible as contracted for is without the lip; but if the crucible contracted for has the lip, then the diameter of the cover should exceed the outside diameter of the crucible by at least one-half inch, so that the cover will cover the opening of the lip and as well the opposite side of the inside of the top of the crucible.

Respectfully,

William L. Brown
Superintendent Melting & Refining
Department

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 18, 1912.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The Melting and Refining department is in need of the following supplies, in addition to those ordered yesterday, viz.:

75 No. 20 Graphite crucibles,
75 " 14 " " "
50 - 14 inch Graphite stirrers, and
50 "K" Crucibles

Respectfully,

Joseph W. Williams

Supt. Melting and Refining Department.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 25, 1918.

Hon. George E. Roberts,
Director of the Mint.

Dear Sir:

The attached page is a copy of an actual worked page of our Register of Deposits, and shows in detail its adaptability to the many purposes of this record, as will be hereinafter fully explained. It is an ample and sufficient record in every respect and for every purpose; we use the one form for "Gold" deposits, "Silver" deposits, and "Re-deposits." On the outside cover of the book we designate its character; for instance, the cover of the book from which the attached page was taken is designated, "Gold 12." It is precisely the record we desire in our work, and we most earnestly request that we be supplied with this form in the future, as we have been in the past, with the slight changes made necessary by the change from "standard" to "fine" ounces, the change of operative officer's title, and additional ruling as shown on blank page opposite copy referred to.

For convenience in reference, I have numbered the columns in red. From the Assayer's certificate we copy the items in columns 3 to 8, inclusive. Column 3 is the deposit number and as well the Assayer's number, and it follows the bar and record in all its movements from the time the deposit is received until it ends in the Refinery melting room. Column 4 is the actual weight of the bar when delivered to us by the Weigh Clerk, after chipping

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Director - 2

for the assay. Column 5 is the weight of the chip which is charged to the Assayer, and the sum of columns 4 and 5 make the total gross weight, shown in Column 6, of the bar as paid for and charged to this department. Columns 7 and 8 give the respective finenesses in gold and silver. Column 9 shows the standard ounces of gold in the bar, calculated on the weight given in column 4; and column 10 shows the gold ounces (or fraction) calculated on the chip weight as given in column 5; and the sum of these two columns, 9 and 10, is shown in column 13, which is the total standard ounces of gold in the bar as paid for. By the same process, columns 11 and 12 show in column 14 the total standard ounces of silver in the bar as paid for. Column 15 shows the actual Refinery charges. Column 16 is a repetition of the "Bar No." for convenience in cross reference. Column 17 is for remarks, and is frequently used to show the adjustment in weight of grains, when the same are of sufficient amount as to require a separate assay.

The figure 9 in the upper left hand corner is the page number; the figures below it -- 3247 - 3296 -- show the deposit or assay numbers of the bars contained on the two pages shown at that opening of the book, the copy shown being the second page.

On the left margin of the page is stamped the abbreviation "Ref'y," at the time the Anode melt "make-up" sheet is compared

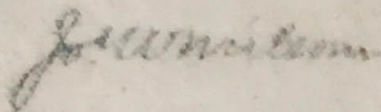
MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Director - 4

and satisfactory in every way, and is very much better for convenience and accuracy of work than the small books sent us some time ago, particularly as the latter require a line across two pages to make each bar record, crossing the break of the book in every calculation -- and the book is a spring back at that.

I most earnestly recommend that we be furnished this Register from the copy hereto attached.

Respectfully,



Superintendent Melting and Refining Department.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 28, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Referring to the Director's letter of the 21st ult., I estimate that the Melting and Refining Department of this Mint will require, during the fiscal year 1914, the following list of graphite supplies:

No. 80 Crucibles	-	-	-	-	600
Covers for same	-	-	-	-	100
Rings, 2 inch	-	-	-	-	200
" 4 "	-	-	-	-	200
Dipping Cups, No. 3	-	-	-	-	200
" " " 4	-	-	-	-	200
Gold stirrers, round	-	-	-	-	100

In this connection, permit me to call your attention to a letter of even date, regarding the No. 80 Crucibles.

Respectfully,

Joseph M. ...
Superintendent Melting & Refining Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 28, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

As the Director's letter of the 21st ult. invited suggestions regarding the special types of graphite goods manufactured for our service, I deem it my duty to call your attention to the last lot of No. 80 Crucibles we received.

In May, 1912, at the request of Miss Kelly (when she was visiting this Mint), I prepared and presented to her, specifications for a No. 80 Crucible, which, as she desired, was made a little smaller than our old No. 80.

Some time later our said specifications were used for a standard crucible to be known as "Specification 80". However, the Director, by letter dated Sept. 9, 1912, advised us that the said "Specification 80" Crucible had been thickened $\frac{3}{16}$ of an inch all over, and afterward we were informed that all the increased thickness had been put on the inside of the crucible, which of course further decreased the capacity, and without a corresponding increase in the life of the crucible.

Now as to some of the ascertained facts: The new crucible, on account of its increased thickness, in nickel ingot work requires from 30 to 40 minutes more time in making the first melts

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

in the forenoon (and some additional time in succeeding melts), with a decreased amount of metal, and a continual forcing of the furnaces which causes the furnaces to burn out very rapidly. On nickel we formerly averaged about 3500 ounces to the melt, and with the new crucible we average about 3300 ounces. With the old crucible, we got from 7 to 8 melts of nickel, and with the new one we get from 8 to 9 melts -- an average increase of about one melt to the crucible. We have used the new crucible very little on any ingot work other than nickel.

In the Refinery, we get an average of nearly two more melts from the new crucible, but with an actual decrease in the amount of metal melted; for instance, with one old crucible we could melt approximately 90,000 ounces of fine gold, while one new crucible running two additional melts will melt only about 84,000 ounces.

We used to make 5700-ounce silver anode melts; now we are limited to 5200 ounces.

So, while there is a slight increase in the number of melts that can be made with the new crucible, the gain from that source is not sufficient to overcome the loss occasioned by the necessity of making lighter melts, the increased time required for melting, the additional fuel oil used, and the increased amount of furnace repairs.

I therefore most earnestly recommend that the No. 80 Crucibles

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

hereafter furnished this department be made from the original specifications for the "Specification 80" and that is without the increased thickness later adopted.

Respectfully, 9-11

Joseph M. Wilson

Superintendent Melting & Refining Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 9, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank books and blank forms for the use of the Melting and Refining Department during the next ensuing fiscal year. These will not be required before July, 1913. Samples are attached hereto.

Form No.	No. on hand	No. wanted	
889	200	300	M. & R. Daily Balance
929	500	500	Melts for Parting
773	500	1000	M. & R.'s Settlement
338	None	1	G. Dep. Sent to Ref'y
869	None	1	Refinery Account

Respectfully,

John W. Milson
Supt. M. & R. Department.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 8, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

About the middle of March we commenced the general use of the pulsating current in our gold cells in the Refinery. The alternating current is delivered through a 39 K.W. Induction Regulator, with 2200 volts on the primary circuit, and a capacity of 36 volts, 1300 amperes, on the secondary circuit. We use a D.C. voltage of 1.2 per cell and an A.C. voltage (maximum) of 1.8 per cell; current density, 65 amperes per sq.ft. The electrolyte contains 60 gms. of gold per litre, and from 4% to 7% hydrochloric acid; temperature, 65 deg. C.; amount of current used in regulator in April, 4400 K.W.

The remarkable benefits of this new system, as applied to the character of bullion received at this Mint can be best shown by a comparison with our operations under the former or D.C. system. Our Refinery has been in operation (in this fiscal year) since October 1st, 1912, a period of seven months; the months of October, November, and December, 1912, and January and February, 1913, (which I shall hereafter refer to as the "five months") we operated under the old system. In March we made the change and in that month operated under both systems, and in April we used the new system exclusively; so in making comparisons I will omit the

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Superintendent - 2

month of March, and use the first five months under the D.C. system and compare the average of those months with the month of April under the pulsating current system.

Under the old method we could not "make up" many gold anode melts (because we did not receive enough high grade bullion to permit it); so in October, after four months' shut-down of the Refinery, we made 25; in November, 9; in December, 12; in January, 10; and in February, 7; total for the five months, 63 melts, weighing 387,335.32 ozs.; while in April (without any change in the character of our deposits) under the new system we made 44 gold anode melts weighing 236,778.77 ozs., and we could have made many more if we had needed them. During the "five months" the gold anodes amounted to 18.6 per cent. of the total amount of bullion operated upon in the Refinery; while during the month of April the gold anodes comprised 58.5 per cent. of the total operated upon. This radical difference is due to the reduced necessary fineness of the gold anodes; and to show that feature clearly I have tabulated, and attach hereto, a list of all anodes that passed through the gold cells in the month of April, showing in connection with each one its number, gross weight, fineness in gold and silver and as well the amount of base metal. In the "five months" we produced 731,669.949 ounces of fine gold, and recovered from the slimes (and scrap gold contained therein) 125,821.30 fine ounces; that is, the gold in the slimes equalled

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

in amount 17.19% of the fine gold deposited on the cathodes. In the month of April we produced 224,161.16 ounces of fine gold, and recovered from the slimes (and scrap gold therein) 25,496.89 ounces of fine gold; so that in this month the gold recovered from the slimes equalled in amount 11.37% of the gold deposited on the cathodes, and the average fineness of the fine gold under each system was .9995 plus.

Further, in the "five months" we used acids as follows: Hydrochloric, 28,184 lbs., and nitric, 28,023 lbs., an average per month, respectively, of 5,637 and 5,605 lbs. In April we used hydrochloric acid, 12,954 lbs., an increase above the average of 7,317 lbs., costing \$109.75; and we used 1041 lbs. of nitric acid, a decrease below the average of 4,564 lbs., which would have cost \$422.17, thus making a net saving in acid for April of \$312.42.

Further, the cost of operating the Refinery for the "five months" was \$23,332.94 (including in each month \$414.41 as 1/9 shut-down cost), being an average of \$4,666.58, and the cost for April (including said \$414.41) was \$4,478.38.

Further, the production of fine gold for the "five months" was 731,669.949, an average of 146,333.989 per month, and our production of fine gold in April was 224,161.16 ozs., being an increase over the average of said "five months" of 53%.

Further, in the "five months" we sent to the Refinery 244 silver anode melts, weighing 1,319,761.90 ozs., an average per

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 4

month of 263,952.38 ozs., and in the month of April we sent 20 silver anode melts weighing 104,047.60 ozs; and in the "five months" we used 139,718.97 ozs. of mint fine silver bars, in making up our said silver anode melts, which was absolutely necessary on account of the comparatively small amount of silver deposits received here. However, in April, we did not use any mint fine silver, and we also cut out of operation one-half of our silver cells.

Respectfully,

John Wilson
Superintendent M. & R. Department.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 19, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answering the Director's letter of May 6th, I desire to call your attention to my letter of March 28, 1913, concerning crucible sizes; and I want to emphasize every statement contained in said letter in support of my objection to any further reduction in the size of crucibles furnished for our use.

When Miss Kelly came to us a year ago, she desired to have us accept the "70 Special" crucible; but after she had gone into the matter fully here on the ground where we were doing the work, she came to the conclusion that it would be better to strike some kind of an average between said crucible and the Denver "No. 80 Special," so that all the Mints could use the same size; and, recognizing the advantages of a "standard," we consented to the reductions shown by details of the "Specification 80," which latter was satisfactory to Miss Kelly and would have been to us if its thickness had not been changed thus reducing its capacity, or, if the added thickness had been placed on the outside. I cannot understand why nearly everyone we come in contact with on this question wants to reduce the size of our crucible; and I do not say that in a petty way, but because such reduction actually reduces the amount of work we can do per day, and so of course adds to the cost of

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

that which we do perform, and it seems to me it would necessarily work the same in other institutions. To illustrate:- The number of ounces to the melt is reduced without any possible way of recouping the loss in weight, because the reduced size of the melts does not, owing to the increased thickness of the crucible, lessen the time of melting, so that it is impossible to make any additional melts per day. And even if the crucible were of the old thickness, yet the reduced weight of the melt would not near save a sufficient amount of time in the melting to allow us to make an additional melt per day.

I am firmly convinced that, for our use, the old Denver "No. 80 Special" crucible was the most economical and satisfactory that we have ever used in this Mint.

The original "Specification 80" had a top inside diameter of 9-3/4 inches; the altered "Specification 80" of 9-5/8 inches, and the "70 Special" of 9 inches; and there are other differences also which tend to decrease the capacity. So that, in answering the questions of the Director: (1) We should not prefer the "70 Special" to the altered "Specification 80" which we are now using; and (2) the "70 Special" would not be at all acceptable in place of the original "Specification 80;" in fact, I respectfully protest against being required to use the "70 special" for any purpose. And I earnestly recommend that we be given for our use either the original "Specification 80" or the altered "Specification 80," the same as we are now using, the former being preferable.

Respectfully,

Supt. M. & R. Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 28, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

The Director, in his letter of the 24th inst., has correctly gauged our desires with reference to crucibles, and the dimensions he sets forth in said letter, to wit:

"Denver No. 80 Special"

$16\frac{7}{8}$ Height outside, 17 in.
 $15\frac{1}{4}$ Depth inside, $15-1\frac{1}{2}$ in.
 $12\frac{1}{2}$ Diam. top, outside, $12-1\frac{1}{2}$ in.
 $9\frac{3}{4}$ " " inside, $10-3\frac{3}{8}$ in.
 $12\frac{5}{8}$ " bilge, outside, 13 in.
 8 " bottom, outside, 8 in.

Weight, avoird. lbs., $42-1\frac{1}{2}$; and capacity, 5 gals., 1 qt., 3

are the dimensions of the crucible we most earnestly want for our work, as it is the most satisfactory and economical of any we have ever used. If any other mint contemplates the use of this crucible and desires a thicker wall, it would be entirely satisfactory to us if the added thickness should be placed on the outside.

We never had any original draft of this particular crucible, and so I used an old draft of our first crucible -- changing the figures to correspond with the above -- to make the four blue prints which accompany this letter.

Respectfully,

Supt. M. & R. Dept.

MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

July 21st, 1913.

Hon. Frank M. Downer,
Supt., U. S. Mint,
Denver, Colorado.

Sir:

In the forenoon of last Saturday, and at about the hour of 11:20, Wm. N. Dardis, while pouring bronze ingots, was severely burned on the left arm.

It occurred in this way:- The molten metal in the partially filled mold exploded, some of it shooting up to the ceiling of the melting room, which is about 21-1/2 feet high, and some of it striking his left arm below the shoulder; he had on a denim oversleeve held in place by a rubber band, and the molten metal lodged between the shirt sleeve and the outer denim sleeve next to and above the rubber band, and before it could be removed it had burned the arm quite seriously. Dr. Wiest has not stated how long he will be incapacitated by the injury.

The reason for the explosion is not known; the mold might possibly have had too much oil in it, or a drop or two of water may have in some unaccountable way been splashed on it before it was put together; we have had similar experiences before with bronze ingot work, that is, slight explosions or spitting of the molten metal out of the mold.

Respectfully,

James Wilson

Supt. Melting & Refining Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 15, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to the J. H. Gautier & Co.'s letter of Aug. 5th:

I have no information regarding the requirements of the blueprint for the No. 80 Mint Special Crucible submitted to the company by the Bureau at Washington, but if it closely approximates the following dimensions, it will be satisfactory, to wit:

Height outside, 17 inches; depth inside, 15-1/2 inches;
Diam. top outside, 12-1/2 in.; diam. top inside, 10-3/8 in.;
Diam. bilge outside, 13 in.; diam. bottom outside, 8 in.;
Weight, 42-1/2 lbs.; capacity, 5 gal. 1 qt. 1 pt.;

and the crucible must not have any lip of any kind.

As to the skimming cups, we have never used any other than those we have made ourselves; so the order can be filled by sending us the regular stock skimmer, medium size.

The No. 4 Dipping cups should closely approximate the following measurements:

Height outside, 5-1/8 in.; depth inside, 4-1/2 in.;
Diam. bottom outside, 4-1/8 in.; thickness of sides, 9/16 in.;
Length of sides of triangular top inside, 4-3/4 in.; same
outside, 5-7/8 in.; weight approximating 35 Troy ozs.

Special care should be taken in burning these cups, so that they will stand the work required of them.

Respectfully,

Joseph M. ...
Supt. M. & R. Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 15, 1913.

Hon. Frank M. Downer,
Superintendent, U. S. Mint,
Denver.

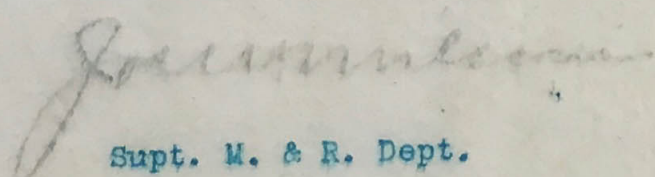
Sir:

The product of the Denver Mint Refinery from the beginning of operations, Feb. 7, 1906, to June 30, 1913, was:

Fine ounces of Gold	10,735,766.807
" " " Silver	4,298,142.91

The amount of P. & R. charges collected on Re-deposits from April 1, 1911, to June 30, 1913, was \$72,279.97

Respectfully,


Supt. M. & R. Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 10, 1913.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

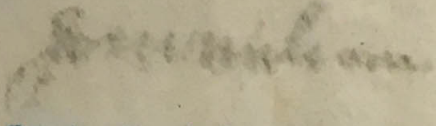
Sir:

In January, 1913, Horace W. French was assigned to service in this department as a Refinery helper at a wage of \$3.50 per day. He has served the usual probationary period of six months, and has learned to perform his duties in a satisfactory manner.

I therefore recommend that he be transferred from the position of "Painter" to that of Refinery Helper at a compensation of \$4.00 per day, that being the regular wage for such work.

The title of "Painter" now held by Mr. French is included in Schedule D, section 1, and the position of "Helper" to which I have recommended his appointment is in the same schedule, section 2.

Respectfully,


Supt. M. & R. Department.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 10, 1913.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Bert H. Taggart, a Refinery Helper, tendered his resignation from the service, and the same was accepted in the month of July last.

A vacancy therefore exists in the Refinery force which it is necessary to fill at the earliest moment, so that upon starting operations in the Refinery, which we expect will be very soon, we may have sufficient men to fill the various places necessary in the Refinery work.

It seems advisable, in selecting men for the Refinery, that we have some previous knowledge of their character and honesty; and having, personally, such knowledge regarding Fred N. Hume, now a fireman in this Mint, I most earnestly recommend his appointment as a Refinery Helper to fill the vacancy caused by said Taggart's resignation.

As is customary, I also recommend that his wage be fixed at \$3.50 per day during the first six months. The position of "Fireman" is placed in Schedule D, section 1, and that of "Helper" is in the same Schedule, section 2.

Respectfully,

John M. ...
Supt. M. & R. Dept.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 22, 1913.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to that part of the Director's letter of the 15th
inst., relating to the Melting and Refining Department, I present
for your consideration the statement attached hereto.

Respectfully,

Supt. M. & R. Dept.

Denver Mint:-

The Superintendent of the Melting and Refining Department received from and delivered to the Superintendent of the Mint during the fiscal year ended June 30th, 1913, the following:

Items		Gold Account	Silver Account	Nickel Account	Bronze Account
Receipts:					
Settlement metal of June 30, 1912		685,562.345	299,908.59	999,877.33	18,414.06
Deposits		1,011,755.840	971,077.03		
Re-Deposits		756,106.785	271,969.72		
Clippings		109,759.537	310,087.03	778,596.10	348,377.30
Condemned coin and blanks		41,468.490	112,046.12	53,131.10	12,025.10
Uncurrent coin				96,184.12	13,432.20
Ingot copper				1,458,420.85	45,135.42
Tin					88,010.42
Zinc					
Cube Nickel				437,500.00	
Total		3,604,649.997	1,964,988.49	3,823,709.49	1,982,737.93
Deliveries:					
Gold certificate bars		778,131.650	3,793.70		1,428,447.70
Commercial bars		733,334.437	1,195,346.13	2,473,734.50	
Ingot		130,040	446.66		
Sweeps		1,023,127.343	766,434.30	1,338,565.18	477,123.23
Settlement metal of June 30, 1913		2,604,622.469	1,966,020.79	3,812,309.68	1,975,570.85
Total			1,052.30		
Surplus		26,528		11,409.89	8,166.90
Wastage					
Amount operated upon		2,464,865.743	2,511,359.54	2,485,144.30	1,506,614.60

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 4, 1913.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

On January 24th, 1911, as Melter and Refiner, I wrote the superintendent recommending the ^{promotion} proposition of Refinery helpers George N. Spencer and Samuel R. Whitaker, to the position and pay of Melter, saying, among other things,

"they have both rendered very satisfactory service, and long ago acquired the ability to perform the duties of a Melter; in fact, they have been performing such duties in the absence of the Melters for a considerable length of time, and they have performed the additional work cheerfully and with much care."

Since that time, more than two and one-half years, Whitaker has continued to do much furnace work; in fact, he runs a furnace most of the time in the Refinery melting room, and when the Refinery is closed down, we use most of the Refinery men in the Ingot room; and at such times we always put Whitaker in charge of an ingot furnace as a Melter, just as he has been continuously doing during the last three months. At the present time one of the Refinery Melters, Gray, is working in the Ingot room, thus leaving only two Melters in the Refinery melting room, and making it necessary to put Whitaker on a furnace in Gray's place.

Whitaker was appointed a Helper in the Refinery melting room May 7th, 1906, so that he has had over seven years experience in the melting room, and considerable of the time as a Melter; and as such he has done good, satisfactory work; and I most earnestly

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

recommend that he be promoted to the position of a Melter at the regular per diem compensation for such work, viz: \$4.50.

Respectfully,

W. W. Miller
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 20, 1913.

Mr. J. W. Sittig,
908 Temple Court Bldg.,
New York, N.Y.

Dear Sir:

Answering yours of the 12th inst., we are not quite ready to place an order for porous cells to be made of the same material as those you last furnished us, because they were very unsatisfactory, only rendering about 25% of the service of those you formerly furnished us.

From the way these last cells deteriorate, I have come to the conclusion that the body of the cell is made first and the bottom inserted afterward, or if they are made in one piece then there must have been a defect in the mold at the bottom, because the cells disintegrate and chip off all around the bottom along a line which is just the thickness of the side walls, back from the edges; or in other words, precisely along what would be the edge of the bottom piece if it was an inserted one. We use these cells exclusively in making gold chloride, the solution in the chloride cells being equal parts of water and hydrochloric acid, and the electric current passing through approximating 40 amperes per square foot of anode surface.

I should like you to quote prices on the following vessels, delivered at the U. S. Mint, Denver, with an estimate of the time necessary to make delivery after receipt of order, viz:

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Sittig - 2

6 earthenware conical filters, fig. 148, cap. 33 gals., with outlet at the bottom, ground-in $\frac{3}{4}$ inch cock, with sieve plate shelf or rim $2\frac{3}{4}$ inches from bottom, but without the sieve plate.

3 porcelain tanks, fig. 0.1799 - 640 x 480 x 510 m/m, with shelf or rim for sieve $2\frac{1}{2}$ inches from bottom, and ground-in $\frac{3}{4}$ inch stop cock, but without sieve plate.

3 porcelain jars, fig. 1.240 - 108 litres, 540 x 560 m/m.

An early reply with complete catalogues of both earthenware and porcelain supplies will be appreciated by,

Yours truly,

Frederick C. Sittig
Supt. M. & R. Dept., U. S. Mint.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 23, 1913.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Permit me to call your attention to a most unsatisfactory condition in the Refinery regarding toilet and dressing-room accommodations:

Several years ago, it was considered necessary to make arrangements whereby the refinery employees could remain continuously within the locked confines of the Refinery from the time they came into the building until they were ready to leave it after completing their day's work; so temporary quarters for the purposes indicated were provided in the following way:

Near the northeast corner of the main refinery room a small wooden booth was placed containing a home-made shower bath, and back of it at the corner a toilet was connected up; a dressing-room was built over the laboratory. These answered the purposes temporarily, but are not suitable in any way as permanent equipment, for the following reasons:

It is not necessary to comment on the undesirability of a toilet in the principal working room of the Refinery; there is only one shower bath, and it takes up valuable space in a room that is always very much crowded, and the metal fittings are being fast destroyed by the acid fumes. The dressing-room was built over the laboratory and copper cell rooms up next to the ceiling, and is wholly without

THE MINT OF THE UNITED STATES AT DENVER,

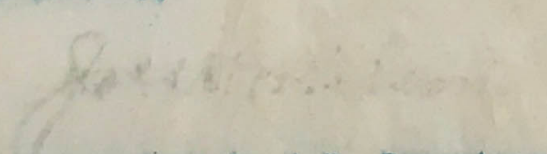
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

ventilation, and the acid fumes from the Refinery penetrate to every corner of it, to the discomfort of the men and the injury of their clothing. And, further, the employees undress from their working clothes and dress into their street clothes in said dressing-room, and so it is absolutely necessary for them to walk in the nude form from the dressing room down the steps into the refinery rolling room and then through the entire length of both the rolling room and the main refinery room to go to the shower bath; and of course they must return to the dressing-room the same way.

Therefore, to overcome the inadequateness of said equipment, to properly protect the men and their effects, and to restore the Refinery to a condition at least fairly comparable with the other operating rooms of this institution, I most earnestly recommend that some method be devised whereby we can have two shower baths, a like number of toilets, and a suitable dressing-room installed contiguous to said Refinery.

Respectfully,


Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

January 14, 1914.

Hon. Thomas Annear,
Superintendent, U.S.Mint,
Denver.

Sir:

Soon after starting the gold chloride cells, early in October, we discovered that the porous clay cells surrounding the cathodes disintegrated very rapidly; we took the matter up with the manufacturer's agent in New York to ascertain if he could furnish us with a more durable cell, and while he did not say he could, the correspondence disclosed the fact that the new cells that we contemplated buying would cost us, in lots of 100, \$4.35 each.

Then, at your suggestion, I immediately took the matter up with local firms, and later with the manager of the Herold China & Pottery Co., who agreed to make us a few samples for testing purposes and deliver them not later than the 10th of this month, but we have not heard from him since.

In the meantime, we commenced experimenting along this line in the laboratory, and in December, Mr. H.L. Whitehead, foreman of the Refinery, devised a wood cell which seemed to work all right; so we equipped one of the regular gold chloride cells with the wood cells for surrounding the cathodes, and they worked finely, and are so working now after more than a week's use, fully as

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

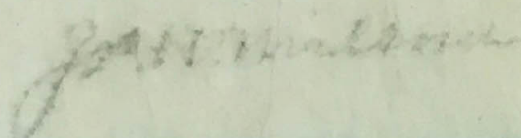
Superintendent - 2

good and with just a little less electrical resistance than the clay cells.

They are made of soft pine, and we have hopes of getting even better results from other woods with which we shall continue our experiments. Later we shall make a number of test runs with both clay cells and wood cells, and report results.

Since the first of October, our use of porous clay cells has averaged 16 per month, and they cost us \$3.07-1/2 each. The wood cells will cost us 15¢ or 20¢ each, and we believe they will last longer than the clay cells and do better work.

Respectfully,



Superintendent M. & R. Department.

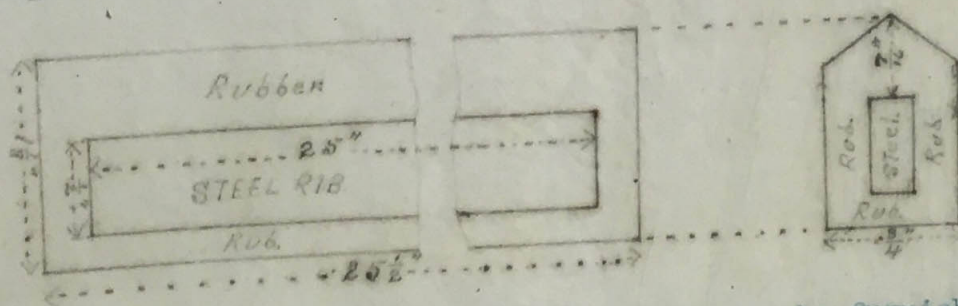
THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 14, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I suggest the obtainment from the American Hard Rubber Co.,
9 Mercer St., New York, of a quotation on 100 hard rubber rods,
with a $1/4"$ x $1/2"$ steel rib running through the center, closed
at each end with not less than $1/4"$ thickness of rubber, so that
no part of the steel rib can be attacked by the acid, and of the
dimensions shown by the following diagram of the transverse and
longitudinal sections, to wit:



Also please ascertain how soon said rods can be furnished after
the receipt of the order, if you decide to purchase them.

Respectfully,

John Wilson
Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 28, 1914.

General Bakelite Co.,
100 William St.,
New York.

Gentlemen:

In reply to your letter of the 24th inst:-

I am trying to find some preparation that I can use around the gold cells (in which we refine gold by electrolysis) to protect the iron and wood, particularly the latter, from the corrosive and disintegrating effects of the acid fumes. For instance, we have a wooden hood over the cells; the inside of it is protected by a lead-lining, and I should like to find something that will resist the fumes and that I can apply to the wood of the windows and the outside of the hood.

The electrolyte contains about 60 gms. of gold per litre and from 4% to 7% of hydrochloric acid, temperature about 70 deg. C.; the electric current passing through is both D. C. and A.C., with a root mean square of approximately 70 amperes per sq.ft. of anode surface; the gases evolved are chlorine at the anode and hydrogen at the cathode. Some of the fumes condense in the hood and on the inside of the windows.

Please advise me if any of your preparations will be useful to me for the purposes indicated above.

Very truly yours,

James M. Wilson
Supt. Melting & Refining Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 17, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

On Nov. 4, 1908, Fred N. Hume entered the service in this Mint as a fireman. In September, 1913, he was promoted to the position of a Refinery helper at the probationary rate of \$3.50 per day, and began the performance of his duties as such on the first of the following month.

During the probationary period he worked earnestly to perfect himself in the duties required of him, and has performed all his duties in a careful and satisfactory manner.

I therefore recommend that his compensation be increased to the sum of \$4.00 per day, being the amount received by all other helpers doing the same class of work, and that said increase be made effective on April 1st, 1914.

Respectfully,

Joe W. Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 17, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

On Oct. 12, 1906, R. J. Perry entered the service in this Mint as a fireman, and in September, 1913, was promoted to the position of a Refinery helper at the probationary rate of \$3.50 per day; and he entered upon his duties as such helper Oct. 1, 1913.

During the probationary period he has evidenced an earnest desire to do his work carefully and properly, and he has certainly performed all the duties required of him in a satisfactory manner.

I therefore recommend that his compensation be increased to the sum of \$4.00 per day, being the amount received by all other helpers doing the same class of work, and that said increase be made effective on April 1, 1914.

Respectfully,

Joseph Wilson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT.

March 18, 1914.

Hon. Thomas Anner,

Superintendent, U. S. Mint,

Denver.

Sir:

Since the month of November, 1913, we have been getting much better results in the matter of keeping gold out of the fine silver by the following method:

Our agitation in the silver cells is by an air lift of the electrolyte through an inch-and-a-half hard rubber pipe; the vertical section of said pipe rests on the bottom of the cell at one end, and is perforated to permit the solution to enter, but the perforations do not extend below the ends of the anodes, and the bottom end of the pipe is closed. The horizontal portion of said pipe is above the solution and under the carrying rods, and extends from its connection with the top of the vertical pipe to the other end of the cell where it discharges into a filter sunk in the electrolyte. The filter is made of $3/8$ inch soft pine wood, dovetailed and wood-pinned; outside measurements, 3 by 10 inches, and $11\frac{1}{2}$ inches deep. The side of the filter that the pipe discharges toward is made $1\frac{1}{8}$ inches higher than the side on which the end of the pipe rests, so that if the air should be irregular, the splash would all fall back into the filter. The filter is plentifully perforated and lined with two thicknesses of cheese cloth. We keep constantly on hand filters lined ready for use, and when the electrolyte in the filter does not readily fall to the level of the solution in the cell we know the pores of the cloth are well filled.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 18, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Since the month of November, 1913, we have been getting much better results in the matter of keeping gold out of the fine silver by the following method:

Our agitation in the silver cells is by an air lift of the electrolyte through an inch-and-a-half hard rubber pipe: the vertical section of said pipe rests on the bottom of the cell at one end, and is perforated to permit the solution to enter, but the perforations do not extend below the ends of the anodes, and the bottom end of the pipe is closed. The horizontal portion of said pipe is above the solution and under the carrying rods, and extends from its connection with the top of the vertical pipe to the other end of the cell where it discharges into a filter sunk in the electrolyte. The filter is made of 3/8 inch soft pine wood, dovetailed and wood-pinned; outside measurements, 3 by 10 inches, and 11-1/2 inches deep. The side of the filter that the pipe discharges toward is made 1-1/2 inches higher than the side on which the end of the pipe rests, so that if the air should be irregular, the splash would all fall back into the filter. The filter is plentifully perforated and lined with two thicknesses of cheese cloth. We keep constantly on hand filters lined ready for use, and when the electrolyte in the filter does not readily fall to the level of the solution in the cell we know the pores of the cloth are well filled

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Supt. - 2

with fine gold; so we take it out and put in a clean filter, and the exchange can easily be made in two or three minutes. When we take out a cell, we siphon off the electrolyte through a filter, then clean the cell thoroughly and again run the solution through another filter when we return it to the cell, thus cleaning the electrolyte of practically all of its gold.

Respectfully,

John W. Wilson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 18, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I take pleasure in presenting additional information on the porous cell question, regarding which I wrote you on January 14th, 1914.

At that time we confidently expected to find some kind of porous hard wood that would answer our purpose better than pine, with which we began our experiments. We have carefully tested three other kinds of wood, two of them being wholly unsuitable and the third being somewhat inferior to that which we are now using. The general action of the pine cell is so good that our sole object in conducting other wood tests (which we will make as soon as we can obtain the necessary woods) is to find one that is more durable.

The dimensions of the cell we are now using are as follows: Outside length, 9 inches; depth, 8-1/2 inches; thickness, 1-1/2 inches; thickness of side walls, 1/4 inch; and of bottom, 1 inch.

The latest quotation on German cells was \$3.85 each in lots of 100. The last dozen wood cells cost us, for labor in making and the material, 22-1/4 cents each; and their life depends to some extent upon preventing them from coming in contact with the slimes, of which we have an unusual quantity on account of the comparatively low grade of bullion from which we have to make our gold chloride.

We have just concluded a test run on ten consecutive lots of chloride under the conditions and with the results hereinafter set

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Supt. - 2

forth. The tests were made in chloride tanks Nos. 1 and 2 on the north side and Nos. 4 and 5 on the south side. Tanks Nos. 1 and 4 contained the wood cells, and Nos. 2 and 5 contained the imported German clay cells; everything was done under our ordinary working conditions, except making the accurate measurements necessary for comparison. In starting up the chloride tanks we put in each one 15 liters of water and 15 liters of hydrochloric acid, and all additions of solution and acid were carefully measured and precisely the same amount added to each tank and at the same time.

The anodes in all competing tanks were of the same quality in each test, although the quality varied widely in different tests (as in our regular work). The following list shows the anode gold content and the amount of gold in the chloride when taken out of the tanks:

No. of Lot	Anode Gold Fineness				Grams of Gold per C.C. in Chloride Produced			
	Tank 1	Tank 2	Tank 4	Tank 5	Tank 1 Wood	Tank 2 Clay	Tank 4 Wood	Tank 5 Clay
1	926	926	926	926	187	192	174	168
2	926	926	926	926	234	232	194	149
3	898	898	898	898	185	160	162	172
4	898	898	898	898	251	245	221	225
5	898	898	898	898	233	205	189	180
6	901	901	901	901	165	182	160	150
7	901	901	901	901	239	248	217	189
8	901	901	901	901	160 *	180	150	125
9	945	945	945	945	233	170	178	226
10	945	945	945	945	193	195	160	173
					2080	2009	1865	1757

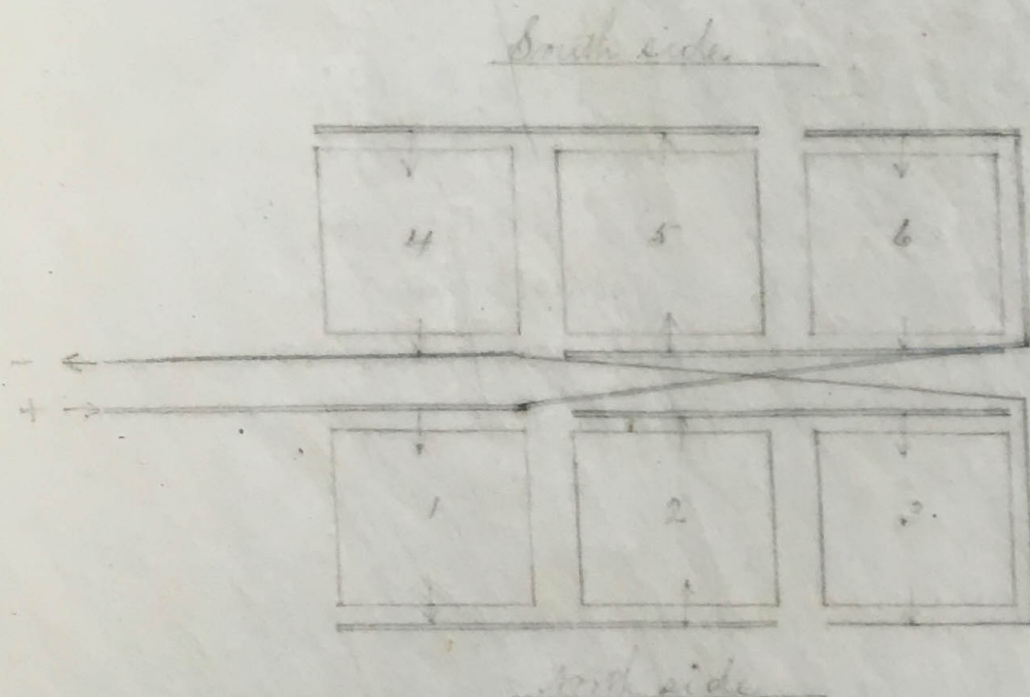
* One of the wood cells did not seem to be working well, and an examination disclosed a loose electrical connection.

The electrical resistance is not noted because repeated tests showed that there was apparently no difference between the wood and clay cells.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Supt. - 3

As there is a considerable margin in the results between the tanks on the north side and those on the south side, I append the following sketch to show the flow of the electric current:



The positive wire is shown by two lines, and the negative by one line.

As a clay cell goes out, we replace it with a wooden one; and at the present time ten of the eighteen cells in use are made of wood.

The average result is in favor of the wood cell, and it is certainly much cheaper than the German production.

Respectfully,

John W. ...
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER.
MELTER AND REFINER'S DEPARTMENT,

April 3, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank forms
and stationery:

1000 Form No.773 M. & R. Settlement (none on hand)

1000 ruled M. & R. letter-heads

1000 ruled M. & R. note-heads

6 Selfacting binders (for Spec Reg sheets)

Respectfully,

Frederick M. ...

Supt. M. & R. Dept.

Sample of Form No.773 attached.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

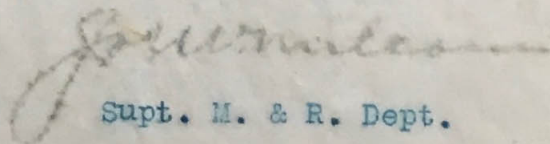
April 3, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

For some time past the wearing quality of the rubber gloves furnished us have been very unsatisfactory; the average life of the white ones being about seven days, and of the black ones about two weeks. In the month of November, 1913, the contracting company did not have any of the kind of gloves it had been supplying us with under the contract, and was compelled to substitute a few others of a better quality with the result that they lasted on the average almost two months. Under the contract the price of the white rubber gloves is \$1.25 per pair, and the black ones, \$2.20 per pair. The retail price of the substitute (white) rubber gloves is \$3.25 per pair, and probably can be purchased under yearly contract for a less price.

Respectfully,


Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 9, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In response to the Director's letter of the 25th ult., wherewith he enclosed, with others, "Form 900, Melter and Refiner's Settlement, for the purpose of revision," I present herewith a revised "Form 900," with the following observations thereon:

Debit Side

1. The word "redelivery" as found on the debit side of all accounts, except the Ingot, does never mean a redelivery of all the metals delivered at the preceding settlement, but only that portion of them that returns to the department from whence they came; so it should never occupy more than one line, and that without any particularizing items, only a total. For instance, there can be no redelivery of "Ingots" after settlement to the superintendent of the M. & R. Department, because they are in possession of the Superintendent, and he always transfers them to the Coiner.
2. In the Assayer's account, on the old form six lines were used to designate the items of redelivery; yet there was only one of the items redelivered. The year's debit account, outside of said redelivery, occupied only one line. In this account, and all others, the "Redelivery" should be only one item.
3. In the Minor Coinage metals account, the "Redelivery" should

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Superintendent - 2

a only one item.

4. The word "Surplus" should appear on the debit side of all accounts of gold and silver.

Credit Side

5. In the Assayer's account, bars are returned from time to time throughout the year, and all sweeps are returned prior to settlement; so there are returned at settlement only "Proof" metal and "bars" (alloy silver).

6. Ingot account: Everything is returned by the ingot room prior to settlement except "sweeps."

7. Minor Coinage Metal account: "Returned at settlement" should carry the additional items, "Copper," "Nickel," "Tin," "Zinc."

8. All other changes from the old form are self-explanatory to those familiar with these accounts.

Respectfully,

Joseph Wilson

Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

April 9, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

A few days ago I issued a requisition for 1000 settlement sheets, old form, No. 773. The new form, "899", is not suitable for settlement purposes for the following reasons:

1. It carries 5 columns for "values," an item that is never used in settlement sheets.

2. The horizontal lines are too close together, because in this mint we reweigh all bars before settlement, and in making up the sheets preliminary to the said reweighing we insert in pencil the book weight near the top of the space between the lines; and later when we do the weighing we write the actual weight in ink at the bottom of said space -- on the line. We then recalculate all the bars on these preliminary sheets twice before typewriting them for the settlement commission.

3. The vertical lines are so close together (on account of the insertion of "value" columns, referred to in paragraph 1) that there is not sufficient room for typewriting in the necessary figures, there being only a quarter of an inch for three-figure spaces.

4. One set of these typewritten sheets is always used after "Redelivery" as a "Register of Deposits," and from these we do all our work relating to settlement bullion, such as making up anodes, checking "Refinery deliveries," etc., and there is not sufficient

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

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room on form "339" for all such purposes.

5. The old form "773" by changing the word "standard" to "fine" becomes ideal for settlement purposes.

6. For ready comparison, I attach both forms.

Respectfully,

J. W. Wilson

Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 9, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The sheets of "Form 968," which we use as our register of deposits, could be much improved by using a better paper and making a little change in the ruling of the lines:

1. The horizontal lines are $3/16$ of an inch apart, and they should be $5/16$.
2. As to the vertical lines: the decimal column under "weight after melting" is $1/4$ inch wide, and with us it is a three-figure column, because as the chips are weighed to the thousandth we carry the decimal weight of the bar to the thousandth, so that the addition will give us the actual gross weight; we do this for accuracy in the accounts.
3. The space for gross weight of the "slip" (should be "chip") is one column and only $9/32$ inch wide; yet the space for the fine ounces in the chip, which are derived from the gross and therefore must be less in amount, has two columns and is $15/32$ inch wide. This chip space should be in both places the same size as it is for the fine ounces, that is, two columns and $15/32$ inch wide for both.
4. This blank is subjected to much handling, because in it we make our calculations and it is our work-book from which we make anodes, etc., and if an error is made in any calculation it is on this sheet and of course has to be corrected; and the paper is of

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

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such poor quality that it cannot be tampered with to any extent. So if we could have little better paper and ruled to comply with the requirements shown hereinbefore, it would splendidly answer the purpose for which it is intended.

Attach a copy of the form.

Respectfully,

Foran Wilson

Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 15, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In reply to the Director's letter of the 7th inst., relating to gold and silver anode melts:

In considering this matter, it is not necessary to "leave out the last months of last year," as the system was in precisely the same working order during that time as it has been since; in fact, if I had not commenced, when I started up the Refinery, to secure the necessary data for my own use, it would have been impossible to have gone back of the date of Dr. Dewey's visit in compiling the monthly reports.

The gold loss in melting gold anodes for the last six months was 76.212 ounces; and in melting silver anodes 89.829 ounces, making a total anode melting loss in gold of 166.041 fine ounces; in my opinion that amount of loss is quite reasonable.

The silver gain in melting gold anodes during the same period was 1704.82 ounces; and in melting silver anodes 941.34 ounces, making a total anode melting gain in silver for the six months of 2646.16 fine ounces. On account of the large amount of bullion retreated in the Refinery, there is an additional loss that cannot be approximated, but which will increase the gold loss some and decrease the silver gain considerably. The retreating loss will be proportionately much greater on silver than on gold, on account of the nature of the materials,

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

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particularly the silver chlorides.

Now as to the gain on silver: I understand that quite a little difficulty has always been experienced in the endeavor to correctly determine the silver contents of bullion wherein the base is 100 parts or over, the many varieties of base usually present rendering it quite impossible to obtain an agreement between duplicate assays; and with such bullion the base assay almost invariably goes up a point or two, thus reducing the reported silver fineness in like amount, and the silver gain resulting from these conditions shows up in the anode melts. At this point it might be interesting to refer to the quality of the bullion we are treating: Our gold anodes (exclusive of chloride melts), for the last six months have averaged in gold fineness .829, and for the month of March the average was .817.

Our silver anodes for last six months have averaged in base metal 80 points and in the month of March $37\frac{1}{2}\%$ of the melts contained over 100 with an average for the month of 99 parts base metal.

In addition to the foregoing there is another important source of silver gain, and that is the unpaid for and uncalculated silver in fine gold bars; that also shows up in the anode melts; and, in my opinion, reasonably accounts for the heavy silver gain in melting gold anodes.

I have often thought that the best method of basing refinery costs would be on the amount of base metals eliminated, and not on the amount of bullion treated, because it is the base metals that eat up so much acid and make all the trouble.

The Director closes his letter by saying, "It is hoped that you

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MELTER AND REFINER'S DEPARTMENT,

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may be able to improve this work so as to bring the gold and silver figures into closer harmony, and to greatly reduce the excessive gains in silver."

As there is no possible relation between the two metals in this matter, and for the reasons hereinbefore set forth, I do not believe that any improvement can be made in our Melting and Refining department that will tend to bring the figures into closer harmony; however, I shall be pleased to carefully consider any suggestions Dr. Dewey may make in the premises.

Respectfully,

Frederick M. Wilson

Superintendent Melting & Refining Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 29, 1914.

Hon. Thomas Annear,
Superintendent, U.S. Mint,
Denver, Colo.

Dear Sir:

In answer to the Director's letter of the 25th inst., I present the following "statement of the weight of deposits containing unpaid-for silver that entered the anodes during the six months" ending March 31st, 1914:

Gross weight, 118,720.07 ounces.

Respectfully,

John W. Miller
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 2, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In response to your inquiry regarding the use of shot nickel in making nickel ingots, I respectfully present the following statement:

In November, 1911, the Superintendent of this Mint visited the Mint at Philadelphia; and prior to his departure, and on the 7th of said month, I wrote him out a list of questions regarding nickel ingot work, and requested him to submit them to the Melter and Refiner at Philadelphia for answers. Upon his return he handed me the questions, all of which had been answered, and they are now before me.

Question No. 20 was "Remarks," and in answer to that the foreman of the Ingot melting room, at the Philadelphia Mint, presented a typewritten statement, which in words and figures is as follows:

Making nickel ingots and disposing of the troublesome oxides.

With fairly pure metals there is little trouble in making good malleable nickel ingots from the first mixture, but when it comes to remelting the clippings with their gossamer like structure, the great surface exposed to oxidation before the melting point is reached causes the result to be a brittle mixture of nickel and copper oxides with the true alloy. As a palliative, it was our practice to add only a modest percentage of clippings to fresh metals already in a molten condition. With proper annealing of strips during the rolling process the ingots were workable, but

THE MINT OF THE UNITED STATES AT DENVER,
Superintendent - 2 MELTER AND REFINER'S DEPARTMENT,

barely so. Some two years ago experiments were commenced with various deoxidizing materials. Aluminum and Magnesium were tried, but failed to give practical results. Finally, manganese and silicon copper were found to be a perfect "cure-all".

The addition of from 4 to 8 ounces of this alloy to a 3,000 ounce melt of refractory nickel causes a remarkable change in the working qualities of the metal. Ingots thus made may be rolled down to the thickness of a dime without annealing. But for this treatment in the melting room the annealing furnaces would today be struggling with hard, if not brittle, nickel ingots.

Manganese copper contains 30% manganese and 70% copper. Silicon copper contains 10% silicon and 90% copper.

It was the latter part of December before we ascertained where we could purchase the silicon copper and the manganese copper, and then we placed an order for 200 lbs. of the former and 100 lbs. of the latter; but before we received them we had commenced the nickel work and succeeded so well in producing ductile ingots that we have never used any of either of the said deoxidizing materials, and we have never had any trouble with the clippings, and the percentage of good nickel coin produced to the amount operated upon by the Coining department was in 1912: Denver, 66; Philadelphia, 47; and in 1913: Denver, 67.23; and Philadelphia, 51.77.

I set forth these figures to show that our nickel ingots have always been very good.

When the Superintendent was in Philadelphia, he was informed that said Mint was experimenting with a new form of metal known as "cube nickel," and on account of its purity they hoped to get much better results from its use than they had from the use of "shot nickel." He was so strongly impressed with the necessity of having the cube nickel for our use that when bids were called for on 15 tons of nickel, he accepted, with the Director's approval, the bid

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to furnish the cube nickel, although its cost exceeded that of the shot nickel by more than five per cent.

Our success in nickel work has been attributed largely to the use of the cube nickel; and judging from the letter, hereinbefore inserted, of the foreman of the Ingot melting room at Philadelphia, and as well from other information received from various sources, the shot nickel ingots cannot be worked without annealing and then only with difficulty; and we have no strip annealing furnaces of any kind in this Mint, nor have we ever used them on any metal.

Respectfully,



Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 8, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:-

Prior to March, 1913, we had always operated eight silver cells in the Refinery. In that month we installed the necessary equipment to operate the gold cells with the pulsating current, which permitted us to use gold anodes of much lower grade in the gold cells, and removed the necessity of operating the silver cells on a large scale for the primary purpose of producing gold that we could work through the gold cells.

At that time we considered the matter thoroughly, and arrived at the conclusion that we could handle our low grade gold and all of our silver bullion with four silver cells, and we reduced our equipment accordingly. When we started the Refinery last October we concentrated our efforts on the gold work and increased our capacity to twenty gold cells. But the silver bullion was accumulating so fast that in the latter part of December we added two more silver cells, making six in operation. At about the same time it became necessary to connect up two copper cells to recover the values from the base copper that had accumulated, and this used up all the available electric current so that we could not further increase the number of our silver cells.

Prior to the month of June last, we always used up our silver bullion just about as fast as it was received; but during the last ten

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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months the silver bullion has been getting so much baser that we could use only a comparatively small part of it; and it has accumulated to such an extent that something ought to be done speedily, if possible, to remedy this condition. Our largest depositor of silver bullion is the Liberty Bell Gold Mining Co., of Telluride; and prior to last June its bullion contained less than 100 parts of base metal. I think the average was between 60 and 70 parts base; but in that month it increased to from 113 to 174 parts; in July it went to from 191 to 236 parts base, and so on to the end of the year; In September we received one shipment of Liberty Bell weighing 6770 gross ounces that contained over 4100 ounces of base metal. We shall go into settlement next month with over 300 bars of Liberty Bell base silver bullion, if its shipments continue at the present rate, as we have 227 on hand now.

To give you a detailed idea of the character of its bullion at the present time, I submit herewith a list designated by our deposit numbers of all the bullion received from the Liberty Bell in January, February, and March of this year, and for comparison a like list of all the bullion received from said company in the same months of 1913, showing for each item the fineness in gold and silver and number of parts in base metal.

Respectfully,

J. W. Wilson

Superintendent Melting & Refining Dept.

THE MINT OF THE UNITED STATES AT DENVER
MELTER AND REFINER'S DEPARTMENT

Liberty Bell Bullion -- 1913

January				February				March			
Nos.		Dep.		Nos.		Dep.		Nos.		Dep.	
Gold		Silver		Gold		Silver		Gold		Silver	
Fineness		Base		Fineness		Base		Fineness		Base	
1	305	1	884	1	300	1	884	1	307	1	884
2	080	2	886	2	383	2	886	2	348	2	886
3	080	3	886	3	083	3	886	3	085	3	886
4	080	4	886	4	083	4	886	4	085	4	886
5	080	5	886	5	083	5	886	5	085	5	886
6	080	6	886	6	083	6	886	6	085	6	886
7	080	7	886	7	083	7	886	7	085	7	886
11	344	11	886	11	339	11	886	11	339	11	886
12	363	12	886	12	339	12	886	12	339	12	886
13	075	13	886	13	080	13	886	13	082	13	886
14	075	14	886	14	080	14	886	14	082	14	886
15	075	15	886	15	080	15	886	15	082	15	886
16	075	16	886	16	080	16	886	16	082	16	886
17	075	17	886	17	080	17	886	17	082	17	886
18	075	18	886	18	080	18	886	18	082	18	886
19	075	19	886	19	080	19	886	19	082	19	886
20	075	20	886	20	080	20	886	20	082	20	886
21	075	21	886	21	080	21	886	21	082	21	886
22	075	22	886	22	080	22	886	22	082	22	886
23	075	23	886	23	080	23	886	23	082	23	886
24	075	24	886	24	080	24	886	24	082	24	886
25	075	25	886	25	080	25	886	25	082	25	886
26	075	26	886	26	080	26	886	26	082	26	886
27	075	27	886	27	080	27	886	27	082	27	886
28	075	28	886	28	080	28	886	28	082	28	886
29	075	29	886	29	080	29	886	29	082	29	886
30	075	30	886	30	080	30	886	30	082	30	886
31	075	31	886	31	080	31	886	31	082	31	886
32	075	32	886	32	080	32	886	32	082	32	886
33	075	33	886	33	080	33	886	33	082	33	886
34	075	34	886	34	080	34	886	34	082	34	886
35	075	35	886	35	080	35	886	35	082	35	886
36	075	36	886	36	080	36	886	36	082	36	886
37	075	37	886	37	080	37	886	37	082	37	886
38	075	38	886	38	080	38	886	38	082	38	886
39	075	39	886	39	080	39	886	39	082	39	886
40	075	40	886	40	080	40	886	40	082	40	886

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Liberty Bell Bullion -- 1913

<u>January</u>				<u>February</u>				<u>March</u>			
Dep.	Fineness			Dep.	Fineness			Dep.	Fineness		
Nos.	Gold	Silver	Base	Nos.	Gold	Silver	Base	Nos.	Gold	Silver	Base
1	305	662 $\frac{1}{2}$	32 $\frac{1}{4}$	45	300 $\frac{1}{4}$	676	23 $\frac{3}{4}$	101	297	684	19
2	080 $\frac{1}{4}$	866	53 $\frac{1}{4}$	8	283 $\frac{1}{4}$	697 $\frac{1}{2}$	19 $\frac{1}{4}$	3	248 $\frac{1}{2}$	727 $\frac{1}{2}$	24
3	080 $\frac{1}{2}$	866 $\frac{1}{2}$	53 $\frac{1}{2}$	9	083	837	80	4	086 $\frac{1}{2}$	841	73 $\frac{1}{2}$
4	080 $\frac{1}{4}$	866	53 $\frac{1}{4}$	50	083	837 $\frac{1}{2}$	79 $\frac{1}{2}$	5	085 $\frac{1}{2}$	841	73 $\frac{1}{2}$
5	080 $\frac{1}{2}$	865 $\frac{1}{2}$	54 $\frac{1}{2}$	1	083	837	80	6	085	841	73 $\frac{1}{2}$
6	080 $\frac{1}{4}$	866	53 $\frac{1}{4}$	2	083	837 $\frac{1}{2}$	79 $\frac{1}{2}$	7	085 $\frac{3}{4}$	841	73 $\frac{1}{4}$
7	080 $\frac{1}{2}$	865 $\frac{1}{2}$	54	3	083	837	80	8	085 $\frac{3}{4}$	841	73 $\frac{1}{4}$
11	244 $\frac{1}{4}$	737 $\frac{1}{2}$	18 $\frac{1}{4}$	4	083	837 $\frac{1}{2}$	79 $\frac{1}{2}$	9	086	841	73
25	263	710	27	61	239 $\frac{3}{4}$	741 $\frac{1}{2}$	18 $\frac{3}{4}$	110	086	841	73
7	075	867 $\frac{1}{2}$	57 $\frac{1}{2}$	80	232 $\frac{1}{4}$	746 $\frac{1}{2}$	21 $\frac{1}{4}$	1	086	841 $\frac{1}{2}$	72 $\frac{1}{2}$
8	075	867 $\frac{1}{2}$	57 $\frac{1}{2}$	1	080 $\frac{1}{4}$	821 $\frac{1}{2}$	98 $\frac{1}{4}$	9	258	726 $\frac{1}{2}$	15 $\frac{1}{2}$
9	075	867	58	2	080 $\frac{1}{2}$	821 $\frac{1}{2}$	98 $\frac{1}{2}$	123	235 $\frac{1}{2}$	746 $\frac{1}{2}$	18 $\frac{1}{2}$
30	075	868 $\frac{1}{2}$	56 $\frac{1}{2}$	3	080	820 $\frac{1}{2}$	99	131	083 $\frac{1}{2}$	862 $\frac{1}{2}$	54 $\frac{1}{2}$
1	075	865 $\frac{1}{2}$	59 $\frac{1}{2}$	4	080	820 $\frac{1}{2}$	98 $\frac{3}{4}$	2	083	862 $\frac{1}{2}$	54 $\frac{1}{2}$
4	279 $\frac{1}{4}$	696	24 $\frac{1}{4}$	5	080	821 $\frac{1}{2}$	98	3	083	863 $\frac{1}{2}$	53 $\frac{1}{2}$
6	076 $\frac{3}{4}$	856	67 $\frac{1}{4}$	6	080	821 $\frac{1}{2}$	97 $\frac{3}{4}$	4	083	864	53
7	077	855	68	9	241 $\frac{1}{2}$	737	21 $\frac{1}{2}$	5	083	863	54
8	076 $\frac{3}{4}$	857	66 $\frac{1}{4}$	91	266	704	30	8	253	720	27
9	077	856 $\frac{1}{2}$	66 $\frac{1}{2}$					142	193 $\frac{1}{4}$	738 $\frac{1}{2}$	18 $\frac{1}{2}$
40	076 $\frac{3}{4}$	856	67 $\frac{1}{4}$					5	076 $\frac{1}{4}$	906	17 $\frac{3}{4}$
								6	076 $\frac{1}{2}$	906 $\frac{1}{2}$	17 $\frac{1}{2}$
								7	076 $\frac{1}{2}$	905 $\frac{1}{2}$	18 $\frac{1}{2}$
								8	076 $\frac{1}{2}$	905 $\frac{1}{2}$	18 $\frac{1}{2}$
								9	076 $\frac{1}{2}$	906	17 $\frac{3}{4}$
								150	076 $\frac{1}{2}$	906 $\frac{1}{2}$	17 $\frac{1}{2}$
								9	219 $\frac{1}{2}$	763	17 $\frac{1}{2}$

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Liberty Bell Bullion -- 1914

January				February				March			
Dep.	Fineness			Dep.	Fineness			Dep.	Fineness		
Nos.	Gold	Silver	Base	Nos.	Gold	Silver	Base	Nos.	Gold	Silver	Base
1	325 $\frac{3}{4}$	660 $\frac{1}{2}$	13 $\frac{3}{4}$	76	333	643	24	150	338 $\frac{1}{2}$	384 $\frac{1}{2}$	277
12	314 $\frac{1}{4}$	659	26 $\frac{3}{4}$	80	084 $\frac{3}{4}$	876 $\frac{1}{2}$	38 $\frac{3}{4}$	3	319 $\frac{1}{4}$	633 $\frac{1}{2}$	47 $\frac{1}{4}$
3	089 $\frac{1}{2}$	822	88 $\frac{1}{2}$	1	084 $\frac{3}{4}$	876 $\frac{1}{2}$	38 $\frac{3}{4}$	4	055 $\frac{1}{2}$	700	244 $\frac{1}{4}$
4	089 $\frac{1}{2}$	822 $\frac{1}{2}$	88 $\frac{1}{2}$	2	084 $\frac{3}{4}$	876 $\frac{1}{2}$	39	5	055 $\frac{1}{2}$	702	242 $\frac{1}{4}$
5	089 $\frac{1}{2}$	822 $\frac{1}{2}$	88	3	084 $\frac{3}{4}$	876 $\frac{1}{2}$	39	6	055 $\frac{1}{2}$	701	243 $\frac{1}{4}$
6	089	820 $\frac{1}{2}$	90 $\frac{1}{2}$	4	084 $\frac{3}{4}$	876 $\frac{1}{2}$	39	7	055 $\frac{1}{2}$	700 $\frac{1}{2}$	244
7	089 $\frac{1}{2}$	823	87 $\frac{1}{2}$	6	053	733	214	8	055 $\frac{1}{2}$	698 $\frac{1}{2}$	246 $\frac{1}{4}$
8	061 $\frac{1}{2}$	693	245 $\frac{1}{2}$	7	056 $\frac{1}{4}$	728	215 $\frac{3}{4}$	9	057 $\frac{1}{2}$	726	216 $\frac{1}{4}$
9	061	692	247	8	056 $\frac{1}{4}$	728 $\frac{1}{2}$	215 $\frac{1}{4}$	160	057 $\frac{1}{2}$	726	216 $\frac{1}{4}$
20	061 $\frac{1}{4}$	690 $\frac{1}{2}$	248 $\frac{1}{2}$	9	056 $\frac{1}{4}$	730 $\frac{1}{2}$	213 $\frac{1}{4}$	1	057 $\frac{1}{2}$	725	217 $\frac{1}{2}$
33	284 $\frac{1}{2}$	692	23 $\frac{3}{4}$	102	359 $\frac{1}{2}$	624	16 $\frac{1}{2}$	2	057	725	218
7	079	862 $\frac{1}{2}$	58 $\frac{1}{2}$	9	072 $\frac{3}{4}$	795 $\frac{1}{2}$	131 $\frac{1}{4}$	3	057 $\frac{1}{2}$	728	214 $\frac{1}{2}$
8	079	862 $\frac{1}{2}$	58 $\frac{1}{2}$	110	072 $\frac{3}{4}$	795 $\frac{1}{2}$	131 $\frac{1}{4}$	171	256 $\frac{1}{2}$	724	19 $\frac{1}{4}$
9	079	862 $\frac{1}{2}$	58 $\frac{1}{2}$	1	072	795	133	182	050 $\frac{3}{4}$	748 $\frac{1}{2}$	201
40	079	862 $\frac{1}{2}$	58 $\frac{1}{2}$	2	072 $\frac{1}{4}$	795	132 $\frac{3}{4}$	3	050 $\frac{3}{4}$	749	200 $\frac{1}{4}$
1	079	862 $\frac{1}{2}$	58 $\frac{1}{2}$	3	072 $\frac{1}{4}$	795 $\frac{1}{2}$	132 $\frac{1}{4}$	4	050 $\frac{3}{4}$	748	201 $\frac{1}{4}$
2	056 $\frac{1}{2}$	791	152 $\frac{1}{2}$	4	072 $\frac{1}{4}$	795	132 $\frac{3}{4}$	5	050	750	199 $\frac{1}{4}$
3	056 $\frac{1}{2}$	791 $\frac{1}{2}$	152	5	072 $\frac{1}{4}$	795 $\frac{1}{2}$	132	6	050	755	194 $\frac{1}{4}$
4	056 $\frac{1}{2}$	791 $\frac{1}{2}$	152	6	072 $\frac{1}{4}$	795 $\frac{1}{2}$	131 $\frac{3}{4}$	7	050	753 $\frac{1}{2}$	195
5	321 $\frac{1}{2}$	649 $\frac{1}{2}$	29	7	072 $\frac{1}{4}$	795 $\frac{1}{2}$	132	8	050	758 $\frac{1}{2}$	190
58	075 $\frac{1}{2}$	821	103 $\frac{3}{4}$	121	300 $\frac{1}{2}$	663	36 $\frac{1}{2}$	190	249 $\frac{1}{2}$	739 $\frac{1}{2}$	11 $\frac{1}{4}$
9	075 $\frac{1}{2}$	821	103 $\frac{3}{4}$	133	062	751 $\frac{1}{2}$	186 $\frac{1}{2}$	7	245 $\frac{1}{2}$	728	26 $\frac{1}{4}$
60	075 $\frac{1}{4}$	821 $\frac{1}{2}$	103 $\frac{1}{4}$	4	062	752	186	8	046 $\frac{1}{2}$	773 $\frac{1}{2}$	180 $\frac{1}{4}$
1	075 $\frac{1}{4}$	821	103 $\frac{3}{4}$	5	062	752 $\frac{1}{2}$	185 $\frac{1}{2}$	9	047	773	180
2	075 $\frac{1}{4}$	821 $\frac{1}{2}$	103 $\frac{1}{4}$	6	061 $\frac{1}{2}$	752	186 $\frac{1}{2}$	200	047 $\frac{1}{2}$	777 $\frac{1}{2}$	175 $\frac{1}{2}$
3	075 $\frac{1}{4}$	821 $\frac{1}{2}$	103	7	061 $\frac{1}{2}$	752	186 $\frac{1}{2}$	1	046 $\frac{1}{2}$	777	176 $\frac{1}{4}$
5	053 $\frac{3}{4}$	794	152 $\frac{1}{4}$	8	061 $\frac{1}{2}$	749 $\frac{1}{2}$	188 $\frac{3}{4}$	2	046 $\frac{1}{2}$	777	176 $\frac{1}{4}$
6	054	794	152	9	061 $\frac{1}{2}$	754	184 $\frac{1}{2}$	3	047 $\frac{1}{2}$	778 $\frac{1}{2}$	174 $\frac{1}{4}$
7	053 $\frac{3}{4}$	794	152 $\frac{1}{4}$	140	062	750 $\frac{1}{2}$	187 $\frac{1}{4}$	5	086 $\frac{1}{2}$	896 $\frac{1}{2}$	17 $\frac{1}{4}$
8	318 $\frac{1}{2}$	667 $\frac{1}{2}$	14 $\frac{1}{2}$	1	061 $\frac{1}{2}$	752	186 $\frac{1}{2}$	218	043 $\frac{3}{4}$	704 $\frac{1}{2}$	252
				2	062	750	188	9	043 $\frac{3}{4}$	707	249 $\frac{1}{4}$
				3	312 $\frac{3}{4}$	669 $\frac{1}{2}$	17 $\frac{3}{4}$	220	044	721	235
								1	044 $\frac{1}{2}$	720	235 $\frac{3}{4}$
								2	044 $\frac{1}{2}$	720 $\frac{1}{2}$	235

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

5/9/114.

Drysdale Biddle & Sons Co.
Philad^a. Pa.

Gentlemen:

Will you please quote prices on the following:

Not less than 1000 Cop screws, $\frac{1}{4}$ " with 24 thread,

" " 1000 washers for said screws $\frac{1}{16}$ " thick,

All made of Monel metal.

The threads cut on the screw to a point $\frac{1}{8}$ of an inch from the head.

The screws to be $\frac{3}{4}$ of an inch long, exclusive of the head.

Respy.

J. H. Mallcom

Supt. M. & R. Dept.

U. S. Mint

Denver

Colo.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 9, 1914.

Supplee-Biddle Hardware Co.,
Philadelphia, Pa.

Gentlemen:

Will you please quote prices on the following:

Not less than 1000 cap screws $\frac{1}{4}$ " with 24 thread;

" " " 1000 washers for said screws $\frac{1}{16}$ " thick;

All made of Monel metal.

The threads cut on the screw to a point $\frac{1}{8}$ of an inch from the head. The screws to be $\frac{3}{4}$ of an inch long, exclusive of the head.

Respectfully,

Geo. W. Wilson

Supt. M. & R. Department,

U. S. Mint, Denver, Colo.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 18, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The following is a statement of the additions and repairs that should be made in the Refinery during the next shut-down:

Additions:

Iron floor grating to hold moulds;
Wood fire-clay bin;
Flooring top of drying room;
Hot and cold water lines extended to top of drying room;
Runway from elevator to top of drying room;
Small hood connecting with laboratory hood stack to carry off fumes from muffle furnace;
New air line on gold cells for use in cleaning out;
Lead pipe conduit for wires of the gold cell lighting system;
Two new low trucks to carry chloride jars.

Repairs:

Cement floor in melting room;
Lowering elevator by changing bed construction;
Steam lines removed from under silver cell system;
Relining sink with heavy lead;
Hard rubber waste solution lines to boiler room tank;
Lead gutter in gold cell hood to take care of condensation;
Drilling of elbow on outlet to boiler room tank to facilitate blowing out of waste line to sewer;
Recovering with lead of the fan saddle on roof;
Making wood racks for silver and gold cells;
Making wood runway for windows in gold cell hood;
Painting of all iron work;
Calsomining walls and ceiling of generator room.

Respectfully,

J. W. Morrison
Supt. M. & R. pt.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 25, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

After a correspondence, of which you were advised, I this day received from The Supplee-Biddle Hardware Co., 513-517 Commerce St., Philadelphia, quotations on cap screws and washers of Monel metal; and I respectfully request that you purchase for use of the Refinery next year the following:

1000 Flat head Monel metal cap screws, $\frac{1}{4}$ " x $\frac{3}{4}$ " with head $\frac{7}{16}$ " all across and $\frac{7}{32}$ " high, with 24 thread, and thread cut to a point $\frac{1}{8}$ " from the head. The screws to be $\frac{3}{4}$ " long, exclusive of head. Cost quoted, \$3.75 per hundred.

100 lbs. Monel metal $\frac{1}{4}$ " washers, $\frac{1}{16}$ " thick, for said cap screws. Cost quoted, \$84.00 per hundred pounds.

The cap screws of this size in Monel metal are not carried in stock by said company, and must be specially made, and so will take considerable time; and besides, the said quotations are made "subject to immediate acceptance;" so I recommend the placing of this order immediately.

I attach hereto the quotation letter.

Respectfully,

John Wilson
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 29, 1914.

Mr. E. J. Wegor,

Supt. M. & R. Dept., U. S. Mint,
San Francisco, Calif.

Dear Sir:

This is the first year that our Refinery has operated with the pulsating current, and I have wondered whether or not the change would make any material difference in the Refinery wastage. The Director's report for 1913 shows that the New York Assay Office had a Refinery loss of about \$50,000.00; and the question has been raised as to whether or not the pulsating current had anything to do with that loss, as it was the first full year's operation under that system.

We have a hood over the gold cells, and the fumes are drawn through a condensing chamber containing large quantities of old iron. The exit on the roof contains a small fan which is necessary to pull out the fumes, and as there is some condensation at that point we have a receptacle to catch the drip which of course contains a little gold -- not much. But the question remains -- Has any material amount of gold passed out into the air?

Will you be so kind as to advise me as to what steps you have taken in the matter of protection on this point, and with what results, together with your opinion on the first query raised at the beginning of this letter, and greatly oblige,

Yours sincerely,

J. C. Williams
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 22, 1914.

Mr. J. W. Sittig,

5 Beekman Street,

Temple Court Bldg., New York City.

Dear Sir:

Your communication with reference to order No. 217 received. Upon receipt of the goods in New York, please expedite their shipment to Denver, as we desire to clean this matter up as soon as possible. Also forward statement when the order is completely filled.

I thank you for the porous cells shipped with first batch of goods for experimental purposes; but I am sorry to say that, owing to the closure of the Refinery, we have taken no action with reference to the same.

Respectfully,

J. W. Sittig
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

The Superintendent of the Melting and Refining Department received from the Superintendent of the Mint during the period from August 29th, 1913, to July 31st, 1914, inclusive:

GOLD ACCOUNT

In Bullion		Fine Ounces
Returned prior to Settlement	1,882,500.429	2,998,588.630
" at "	1,115,706.884	2,997,207.313
Operating Wastage		381.317
Legal allowance on amount delivered by Superintendent		2,998.588

SILVER ACCOUNT

In Bullion		
Returned prior to Settlement	2,485,722.84	4,211,179.77
" at "	1,726,720.35	4,212,443.19
Surplus		1,263.42

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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MINOR COINAGE METAL

Received:

Redelivery Settlement Metal of August 28, 1913

Copper

Tin

Zinc

Nickel

Clippings

Condemned Coin and Blanks

Total

Troy Ounces

1,116,365.33

1,458,508.33

44,027.08

58,333.33

218,750.00

479,789.40

29,750.60

3,405,524.07

Returned:

Ingots prior to Settlement: Nickel

Bronze

Metal in settlement

Operative Wastage

Total

771,176.20

1,077,779.80

1,549,756.59

6,811.48

3,405,524.07

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 14, 1914.

Mr. E. D. Hawkins,
Chairman Settlement Committee,
Denver, Colo.

Sir:

In answer to your communication of yesterday, I respectfully present the following statement:

The items of Gold Wastage are -- Refinery	329.028	ozs.
Ingot room	36.773	"
M. & R. Dept. exclusive of Refinery		
and Ingot room	20.707	"
	<u>386.508</u>	"
Less surplus returned by Assayer	5.191	"
Total Wastage	<u>381.317</u>	"

The operating wastage in the Ingot room was low, being only six and one-half hundredths of an ounce for each thousand ounces of metal operated upon (exclusive of gain on ingots). The gain in the Assay department was quite reasonable, as the Assayer gets the swing of the needle on thousands of assay chips. The loss in the Department, exclusive of the Refinery and Ingot room -- 20.707 ozs. -- was caused by loss in a mass melt for settlement, 7.930 ozs., and by abrasion, and by a loss of 14.56 ozs. gross weight in reweighing our bullion for settlement.

The Refinery wastage, in my opinion, was principally caused by loss from the gold cells through the medium of chlorine gas and from the furnaces on account of an inefficient settling chamber connected with a small smoke-stack. The wastage was wholly unexpected, and I did not

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Hawkins - 2

at any particular time believe that there would be a loss, because throughout the year we exercised unusual care in all our Refinery work, and confidently expected to at least break even. In this connection, however, I desire to say that Mr. Annear called my attention to a loss of gold on the roof of the building at the fan exit of the stack leading up from the gold cell condenser. Let me make that clear: Over the gold cells we have a convex hood from the top of which four vertical pipes lead up to a large horizontal pipe which conveys the fumes to the condensing chamber, and the exit from this chamber is through a pipe to the roof of the building at which point we have a short horizontal section in which is an electric fan running constantly to assist in pulling out the heavy gases. I frequently discussed this particular matter with Mr. Whitehead, foreman of the Refinery, and he made a number of tests to ascertain the wastage at said fan exit, but the results did not show any important loss. The first series of tests running over a period of two or three months were made by catching the drip at the mouth of said exit in a bucket and ascertaining the gold contents; the next series of tests were made by covering the exit with wire screen and later by soaking cheesecloth in iron sulphate and tying it completely over the said exit and after 24 hours use taking it off and ascertaining the gold contents. Large quantities of iron were constantly kept in said condensing chamber and iron turnings from the machine shop were frequently put in the vertical stack at the exit from said chamber; Mr. Whitehead will probably cover these tests with full details.

In the Refinery, during the last year, our average monthly produc-

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

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tion of gold exceeded that of any previous year in this Mint, notwithstanding the fact that the gold anodes used were undoubtedly much lower in gold and higher in base metal than any ever regularly operated upon in a like institution, towit: the average contents of said anodes for the year were, Gold 826 parts, Silver 142 parts, and Base metal 32 parts; in fact the amount of base metal eliminated in the parting of bullion during the last year was 199,318.98 ozs., or nearly seven tons.

The character of the bullion operated upon unquestionably had much to do with the wastage, because the generation of chlorine gas at the anode was frequent, and the principal cause of the formation of said gas was the bad quality and comparatively large amount of base metal in the anodes. The chlorine gas carries off small particles of gold, and if there is an excessive amount of it being generated it will not all go up the pipes but will float away from the cells around the room and out of the open windows. Very little of it will go out of the room ventilators, which are located on the opposite side of the room from the gold cells and up next to the ceiling, and as said ventilators have only a natural draft the chlorine gas which is $3\frac{1}{2}$ times as heavy as air will rise to that exit very slowly. In our clean-up we recovered from the pipes running from the gold cell hood to the condensing chamber 7.368 ozs. of gold; from the condenser itself 43.254 ozs.; from the room ventilators 7.462 ozs., and from washing the walls and floor of the Refinery room 30.176 ozs., all of which, except possibly a little from the floor, was originally taken out of the gold cells by the said fumes.

In my opinion, another cause of loss was the condition in the melt-

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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ing room of the Refinery. Our settling chamber in this room is a vertical one, connected at the intake end to the furnace flue and at the outlet end to a vertical stack $13\frac{1}{2}$ inches in diameter. This stack is so small that an exceedingly strong draft is caused by the operation of the four furnaces, strong enough to carry up through the stack all kinds of small particles of metal, and strong enough also to practically prohibit the settling in the condenser of any considerable portion of the metals carried away from the furnaces, which is shown by the recent clean-up when we recovered 16.667 ozs. of gold from washing the melting room walls and only 29.120 ozs. from the settling chamber after a continuous run of nine months.

There is another probable source of loss of gold that might be considered, and that is platinum. I have been advised that in the regular assay for gold all of the platinum does not part out with the silver, but that at least 90% of it remains with the gold, and of course is weighed up and reported as gold.

The loss during the year in gold, in melting gold and silver anodes was 248.464 ozs., but against this we have recoveries in the sweeps cellar.

During the years that the gold in bullion was reported by the Assayer to the half-point, we always had a surplus in refining operations; and during the years that we have been operating on bullion reported to the quarter-point we have always had a wastage. In 1912 our Refinery wastage was 269.299 ozs; in 1913 our Refinery wastage was 80.380 ozs. (and in that year we completely dismantled the Refinery, even burning the wood-

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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work, melting lead linings, etc., being the accumulation of eight years' operations, and from those sources recovered approximately 250 ozs. of gold.)

This year we made a very thorough clean-up, and the Refinery loss is 329.028, or about one-fifth of an ounce for each thousand ounces of fine gold produced.

Owing to the low grade of bullion operated upon, the charges were heavy, our collections on bullion treated being \$92,090.55, and estimated value of by-products returned, \$3,617.01.

I have tried to analyze the causes of wastage and devise a remedy. I have already made arrangements to better the condition of the melting room settling chamber by removing the loose hanging wires therefrom and substituting iron screen baffles, similar to those used in the San Francisco Mint which I am advised give better results than any other known baffle.

I started the Refinery in October with four silver cells in operation, but the average of gold fineness of our bullion was so low and the amount of base metal in the silver bullion increased so rapidly (that of our largest shipper increasing from about 60 parts to 200 or 300), that in December I added two more silver cells, and when I start up again it will be with our full equipment of eight silver cells, the purpose being to depend very largely on the gold from the silver cells to supply the anodes for the gold cells. This will decrease the product of fine gold to some extent, but it will also decrease the wastage caused by the gasifying of the gold anodes.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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I have hereinbefore partially answered question No. 3 -- "Did you at any time think that a wastage might occur?" -- and I shall now complete that answer by saying that there was no happening of any kind during the year which upon investigation caused me to think that a wastage might occur. However, the particular thing that always haunts a person in charge of an electrolytic refinery is the fear of a possible loss, and so I could not prevent the occasional intrusion of the thought that a wastage might occur, although it was a thought due to the general conditions that obtain and not to any particular time or happening.

Respectfully,

J. L. Williams
Superintendent M. & R. Department.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Aug. 19, 1914.

Mr. F. P. Dewey,
U. S. Mint, Denver.

Sir:

At the request of Mr. Annear, I submit the following answers to the questions you submitted this A.M:

1. Weight of Gold ingots delivered to Coining Department during the last fiscal year:

Ans.- 526,424.823 fine ounces.

2. Weight of gold scrap returned from Coining Department during same time:

Ans.- 271,962.243 ozs.

3. Average fineness of gold ingots for year:

Ans.- 899.89

4. Weight of fine gold bars delivered to Superintendent:

Ans.- 1,352,913.321 ozs.

5. Weight of fine silver bars delivered to Superintendent:

Ans.- None. Production 730,460.43 ozs.

6. Was gold ever reported in fine silver by Assayer, and if so, how many times?

Ans.- Yes - at my request Assayer for a time made assays for gold on all fine silver melts, and thus reported 46 melts. Thereafter Foreman of Refinery regularly assayed fine silver melts for gold.

7. Weight and average composition of gold anodes:

Ans.- Regular Anodes 1,285,684.46. Composition-Gold, 826; silver, 142; and base metal 32 parts.
Chloride Anodes 282,135.85. Composition-Gold 944; silver, 39; and base metal 17 parts.

8. Weight of gold anodes put into cells:

Ans.- 1,566,870.93 - make-up weight 1,567,820.31.

MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

9. Weight and average composition of silver anodes:

Ans.- 1,228,496.79. -Composition-Gold 384, silver 532, and
base metal 84 parts.

Weight into cells - 1,226,624.06.

Answers to questions 7, 8, and 9 refer to anodes made up in
M & R Office, and not to Refinery make-up.

10. How often was gold reported in fine silver purchased?

Ans.- Twice - having been assayed at request of M & R.

11. Amount of silver produced containing gold that was re-worked:

Answer. 98,062.49.

Respectfully,

John Wilson

Supt. M & R Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 6, 1914.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank book and forms, for the use of this department. These will be needed on and after January 1st, 1915.

	No. on hand	Number ordered	Form No.	Description
Book	0 ✓	1	183	Receipts and Delivery of Silver Bullion
Forms	400 ✓	1000	929	Melts for Parting
	120 ✓	300	889	Superintendent of Melting and Refining Department's Daily Balance
	130 ✓	500	963	Deposits delivered to Superintendent of Melting and Refining (<u>See notation on blank</u>)

Respectfully,

4 blanks attached

John Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 25, 1914.

Mr. W. W. Charles,
Breckenridge, Colo.

Dear Sir:

I have delayed answering your favor of the 16th inst., awaiting the receipt of a copy of your settlement sheets as referred to in said communication. I am enclosing herewith a copy of the Revised Table of Charges, just received, and thereon you will notice I have checked the paragraph that covers your particular character of bullion, if I correctly remember its gold and silver contents. I also herewith return Mr. Austin's letter.

My understanding from our conversation was that you produced only Dore bullion at Tonopah, and the paragraph of charges referred to above specifically covers that class.

I thank you for your promptness in taking up this matter, and beg to remain,

Sincerely yours,

Joel Wilson

Superintendent M. & R. Dept.

2 enclosures

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 27, 1914.

The Herold C. & P. Co.,
Golden, Colo.

Gentlemen:

Replying to your favor of the 25th inst., regarding porous cells, I am very sorry that there is even a possibility of your closing down your plant; and I think it would be advisable for you to complete the balance of our order immediately, and to that end make us 73 more cells of precisely the same quality as the 27 you shipped us Nov. 18th ("Shipment A"). And I most earnestly recommend that you make up a few hundred more of the same kind (as suggested in your letter) to be held in stock for our future use.

Please advise me on the latter point, as it is a very material matter with us.

Sincerely yours,

John W. Milson
Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 11, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The fire clay goods furnished this department are very unsatisfactory:

The pedestals (on which the crucibles sit) melt, and occasionally by so doing cements the crucible to the pedestal so that it cannot be drawn, and that causes a portion of the metal to remain in the crucible so that it cannot be used for a succeeding melt, and it sometimes destroys the crucible entirely in the necessary strain of breaking it loose. Further, such melting of the pedestal sometimes causes the crucible to rest in a position that causes it to crack and spill the metal into the furnace.

The quarter slides warp and crack so that we use many more of them than would be necessary if they were made of first-class material.

The arch brick crack badly, causing the arch to give way and thus requiring the frequent rebuilding of the furnaces.

The fire brick look all right and are very hard, but with an unusual tendency to melt, this condition being especially applicable to the back wall of the furnaces.

These conditions cause some metal losses, reduce our melting capacity, and are very annoying and expensive.

Respectfully,

Joel W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 11, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The inventory of July 1, 1914, charges the Make-up room with two platform trucks, and the Ingot room with one; and that number is wholly insufficient for the necessary handling of bullion in our work.

The Ingot room should have two, and the Make-up room six platform trucks available at all times for the economical and expeditious performance of our work; and there should be at least one additional truck provided to take the place of a Coiner's truck now being used by the Refinery.

Respectfully,

John Wilson
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 11, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

On Saturday I issued a requisition for Ingot room supplies, including, among other things, 12 four-inch rings for No. 80 crucibles; and this morning the foreman informed me that he could obtain only 6 rings of the necessary size, as that was all the Storekeeper had on hand. I immediately took the matter with the Storekeeper, and he informed me that he was entirely out of the four-inch rings for No. 80 crucibles, and that he had only 44 of the smaller four-inch rings for No. 70 crucibles.

The No. 80 rings were Gautier make of the following diameters: outside, 13"; inside, 11".

The No. 70 rings are of Bartley make, of the following diameters: outside, $11\frac{3}{4}$ "; inside, $9\frac{1}{2}$ ".

We use approximately 20 four-inch rings each month; so that, if we could use them on the large crucibles, we have not nearly enough to last through the rest of this fiscal year. In much of our work it will be necessary to return to the use of the small crucible (of which we have only 43 on hand) unless we can get the larger rings, and that will decrease our melting capacity by about 20%. I therefore most earnestly request the immediate purchase of not less than 150 four-inch crucible rings for No. 80 Denver Mint

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Special Crucibles -- diameter outside, 13 inches; and inside,
11 inches.

Respectfully,

Joe W. Wilson

Supt. Melting & Refining Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

January 11, 1915.

In the Month of November the Ingot room made Gold, Silver, and Nickel Ingots. The percentage of cost division is as follows:

Charge to Gold Ingot making	21%
Silver	50%
Nickel	29%

The percentage of cost division between the different denominations of Gold ingots is as follows:

Charge to Eagle ingots	33-1/3%
Half Eagle	66-2/3%

Respectfully,

Joe W. Wilson

Supt. M. & R. Dept.

To the Cost Clerk,
Denver Mint.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 22, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Responding to your inquiry regarding charges on bullion received by the Denver Mint from minor offices:

The Assay offices, on their invoices of bullion shipped to this Mint, certify the amount of charges on each bar, and we have heretofore accepted their figures (without verification) as the amount of the P. & R. charges with which we credit the Refinery after the bullion has been used.

On receipt of your inquiry, I examined several of the invoices from each Assay office shipping to us, and find their practice varies considerably, and in no instance is there any segregation showing the different character of charges, when more than one kind is included. Said examination indicates that,-

Deadwood	includes	P. & R. charges only
Helena	" " " "	" "
Seattle	" " " "	and alloy charges
Salt Lake	" " " "	bar and alloy charges; and
Boise	includes all the foregoing charges, and something else, probably the assaying and stamping charge.	

I do not know how a correct segregation of the charges could be made at any place other than the Assay office that originally purchases the bullion, because nowhere else is there any record of the assay clips or of the paid weight, that is, the weight after melting but before assay samples are deducted.

Respectfully,

Joe W. Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 5, 1915.

In the month of December, 1914, the Ingot room operated upon Gold, Silver, Nickel, and Bronze Ingots.

The percentage of cost division is as follows:

Gold	10.91
Silver	47.86
Nickel	17.09
Bronze	24.14

The percentage of cost division between the different denominations of Silver is as follows:

Quarter dollars	52.63
Dimes	47.37

Respectfully,

To the Cost Clerk,
Denver Mint.

Joseph Milburn
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 13, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In November, 1913, with your approval, I took up the matter of making porous cells with The Herold China and Pottery Co. of Golden, Colorado. Omitting experimental details, I will now report the results obtained. On September 24th, 1914, we began the use of three Golden cells; two of these we discarded on October 29th, because they began to crack at the hanger hole. I had the pottery company lower said hole a little to strengthen the cell at that point, and we have had no trouble of that kind since.

On November 13th we put in five more of the Golden cells, and on January 25th, 1915, found a bottom corner broken on one of them and it was replaced with another of the same kind.

On December 8th we put in use six more of the Golden cells.

You will note that all the Golden cells discarded since we started the Refinery in September, 1914, was on account of breakage.

Present condition: One cell that was put in use September 24, 1914, four cells that were put in use November 13th, six cells that were put in use December 8th and one cell that was put in use January 25th, 1915, have been used constantly since the dates specified, respectively, and all are apparently as good now as when we first began their use.

Observation: These Golden cells do not show any disintegration,

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

nor have they at any time collected any deposit of gold; their porosity and electrical resistance compare very favorably with the German cells, than which they are larger and yet less expensive.

Opinion: The Golden cells are superior to any German production we have ever used.

Respectfully,

Joe W. Milern

Superintendent Melting & Refining Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 20, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The "Denver Specification," No. 80 graphite crucibles purchased for the current fiscal year were delivered in two shipments, on Nov. 15, 1914, and January 9, 1915, respectively.

These two lots are of different quality, the first lot being comparatively poor and the second lot a little worse than the first. These crucibles do not scale off in the way usual with graphite crucibles in our bronze work, but they melt and slag on the outside, and some of them are thicker on the top edge than they are lower down, the latter being specially true of the second lot.

In the month of January, 1915, we had thirteen crucibles crack and spill the molten metal into the furnace, two of them on the first melt; this is very expensive as it necessitates tearing out and rebuilding a part of the furnace after each spill, beside the additional work necessary to prepare the spilled metal for use.

In the month of February, we had eleven break in the same way; they do not eat through from the inside, they crack

I present the results of five full months' work on bronze ingots which apparently emphasizes the inferiority of these crucibles:

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

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For each Crucible used

No. of melts obtained and Amount ingots produced

In October, 1911	7.84	31,130.25 ounces
" August, 1912	7.11	28,386.57 "
" October, 1913	9.36	34,046.05 "
" January, 1915	5.68	21,810.87 "
" February, 1915	6.16	23,347.28 "

The latter month was a little better than January, because we used mostly crucibles from the first lot which was not quite as bad as the second from which we used quite a number in January.

Judging from the results on Bronze work, it might be hazardous to use these crucibles on Nickel ingots which require a much higher heat than bronze.

Respectfully,

J. W. Milson

Supt. Melting & Refining Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 2, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following stationery supplies:

No.	On hand	No. needed	Description
773	400	1200	Settlement Bullion, Dept.
(Form attached)			

6 Self-Acting Binders, with "enclosures" (3 in use, in very bad condition) to hold Form 963 (Deposits delivered to Supt. M. & R.)

Respectfully,

Joe Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 27, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Of the Gautier "Denver Specification" 80 graphite crucibles purchased during the current fiscal year, the Melting and Refining Department has received and used the following number:

Ingot room	160
Refinery	<u>116</u>
Total	276

of which number forty were defective.

Respectfully,

John W. Wilson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 16, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I respectfully present the following statement in response to your communication concerning the loss in Silver for the fiscal year, 1915:

Silver gain in melting Gold anodes	351.95	ozs.
" " " " Silver "	168.92	"
Total initial gain of melting	520.87	"
Recoveries at end of each month from bar anode sweats, etc., aggregate	232.00	"
Recoveries of metal from bar anode sweeps	79.90	"
Recoveries from bar anode sweeps tailing, sold to smelter	124.97	"
Total gain from bar anode melting	436.87	"
Wastage of Ingot room	241.77	"
	678.57	"
Deficit at settlement	1450.84	"
Apparent loss	2129.41	"

The Refinery settlement discloses an operative wastage of 1773.15 ounces, and the difference is accounted for by the gain in making up Silver ingots to a fineness of only .999, which is necessary on account of segregation. Of the Refinery wastage, 599.45 ozs. was in the fine gold returned by the Refinery, leaving a balance of 1174.69 ozs. unaccountable for in any direct manner.

There was some mechanical loss, and the balance is probably a melting loss, because we do a large amount of melting (all other than

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

bar anode melts), from which there is no possible chance of a gain, but, on the contrary, an absolute certainty of a loss; and the fact that we melt considerable silver over and over again would naturally cause most of the loss to be in that metal.

Never has such extreme care been exercised in all our Refinery work as during the fiscal year just ended. The solutions are carefully precipitated, tested, and then filtered before passing out of the Refinery. The smoke and gases from our melting furnaces are not unduly forced by excessive air pressure; and our condensing chamber, while not all we should like it to be, works fairly well. There have been no metal-carrying gases emitted from the regular gold cells during the year -- in fact we have removed the hood from over them, and will never again have any use for it.

The emission of chlorine gas from the chloride cells is a rare occurrence, and when it does occur an immediate remedy is applied.

Our clean-up for settlement shows that our efforts to prevent the outgoing of precious metals from the Refinery have been quite successful; this is evidenced by the decreased amount found in the settling wells.

Mr. E. D. Hawkins, of the San Francisco Mint, says their gain in silver is due to the unpaid silver in Selby fine gold bars.

The report of anode melting from the New York Assay Office for the fiscal year, 1915, shows an initial melting gain on Silver Anodes alone of 3963.69 ounces of fine silver; yet Mr. Chaffin, the chief clerk, informs me that the Refinery melting loss on silver for the year is 1300 fine ounces; and in addition to that the New York Assay Office also

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

the same source of gain as San Francisco from unpaid for silver, as they receive a large number of fine gold bars from private refineries, including the Omaha and New Jersey refineries of the American Smelting and Refining Co. We have no such sources of gain, and owing to the character of our bullion we have the additional loss caused by remelting of fine silver.

Respectfully,

Joseph Wilson

Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 17, 1915.

To the Settlement Commission,
Denver Mint.

Gentlemen:

The gain in melting Gold and Silver Anodes during the
fiscal year 1915 was:

Gold, 420.318 ozs.; Silver, 520.87 ozs.

Mass Melting 523 bars, Gain	"	10.389	"	"	72.55	"
Total	"	431.207	"	"	593.42	"

The above does not include any subsequent recoveries.

Respectfully,

John W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 19th, 1915.

To the Settlement Commission,
Denver Mint.

Gentlemen:

Of the operative wastage in silver during the 1915 fiscal year, 241.77 ozs. occurred in making Silver ingots, and there was 598.45 ozs. contained in the fine gold returned from the Refinery.

There was some mechanical loss and the balance was probably a melting loss, as we do a large amount of melting (all other than bar anode melts) from which there is no possible chance of a gain, but, on the contrary, an absolute certainty of a loss.

In my opinion the silver wastage was not excessive.

John Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

August 19, 1915.

Mr. W. H. Elder:

Dear Sir:

Referring to that portion of the cost report relating to Refineries, it may be difficult to determine any standard basis for the reports on account of the different conditions existing in the various refineries.

In the recent settlement, for the fiscal year, 1915, I returned 2,244,929.49 gross ounces of unpurified bullion with an average fineness of, Gold, .5981; Silver, .2683. We do not receive any refined bullion deposits at this Mint, and so cannot have any assistance from that source in our operations, while the other refineries have practically unlimited quantities of ".992 and over" gold which helps very materially in working their other deposits, as they can and do use any desired amount of it in making gold chloride and in fining up the black gold from the silver cells; while we have to depend largely on the black gold for making chloride and almost wholly for making gold anodes -- regardless of its fineness -- and this condition necessitates the increased use of electricity and supplies, and as well requires more labor in many ways, all of which adds to our cost of production. The cost reports for the last fiscal year show that in the other refineries over one-half of all the gold sent to the refineries was already refined bullion, while in our mint this item was less than 2 1/2% of .992 and over. A compliance with the forms of

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Elder - 2

the cost report now in use required one of the refineries to take credit with over \$15,000,000 of gold as "Refinery product," when not an ounce of it passed through the cells; in fact, more than two and a half million dollars of it was coin and was returned as standard metal, 900 fine; but nevertheless it was credited to Refinery product and necessarily so under said cost form, but it improperly reduced the actual cost per ounce of fine product in that refinery over 23%; that certainly invites correction.

And there is one other item I will refer to, that of "prior product:" I think that cost form in use during the last year required the addition of this item, as such, to the bullion sent to the refinery, and also its deduction, as such, from the fine product. I think our mint was the only one in the service that made use of this item, and we used it only with silver, in the occasional make-up of silver anodes, which was necessary on account of the quality of our bullion. But when it went to the Refinery it passed through the cells the same as any other bullion, and when it came back we were entitled to full credit for the production without any deduction on account thereof; in fact, it was used, in respect to our operations, just the same as the refined gold was in the other refineries, only the amount of it was insignificant by comparison.

These different conditions can, of course, be considered in making comparisons; but, as they rarely are, there ought to be some method devised by which such consideration of disconnected matters would be unnecessary.

Respectfully yours,

Joel M. Milner
Supt. M. & R.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Elder - 2

the cost report now in use required one of the refineries to take credit with over \$15,000,000 of gold as "Refinery product," when not an ounce of it passed through the cells; in fact, more than two and a half million dollars of it was coin and was returned as standard metal, 900 fine; but nevertheless it was credited to Refinery product and necessarily so under said cost form, but it improperly reduced the actual cost per ounce of fine product in that refinery over 23%; that certainly invites correction.

And there is one other item I will refer to, that of "prior product:" I think that cost form in use during the last year required the addition of this item, as such, to the bullion sent to the refinery, and also its deduction, as such, from the fine product. I think our mint was the only one in the service that made use of this item, and we used it only with silver, in the occasional make-up of silver anodes, which was necessary on account of the quality of our bullion. But when it went to the Refinery it passed through the cells the same as any other bullion, and when it came back we were entitled to full credit for the production without any deduction on account thereof; in fact, it was used, in respect to our operations, just the same as the refined gold was in the other refineries, only the amount of it was insignificant by comparison.

These different conditions can, of course, be considered in making comparisons; but, as they rarely are, there ought to be some method devised by which such consideration of disconnected matters would be unnecessary.

Respectfully yours,

Frederick M. R.
Supt. M. & R.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 7, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for blank books and forms for the use of the Melting and Refining Department, for the current fiscal year, as follows:

Form No.	On hand	Number Wanted	Description
871	0	4	Record of Refinery Gold Melts
338	0	1	Gold Deposits sent to the Refinery
929	500	500	Melts for Parting
773	300	1000	Settlement Bullion Dept.

Sample leaves and sheets of the above are attached hereto.

Respectfully,

Joseph M. Wilson

4 enclosures

Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 5, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Your inquiry of yesterday regarding the silver loss in remelting fine silver prompts me to present the data I have gathered on that subject:

The only use we make, at present, in that way of fine silver is in the make-up of Portland silver anode melts, and in the three months' operations of the Refinery just past we made up 45 Portland melts and the net melting gain on said 45 melts was, Gold, 61.654 fine ounces, and, silver, 39.85 fine ounces; and the recoveries at the end of each month and as well the amount obtained from the sale of sweeps from silver anode melts must, in its proper proportions be a direct and actual addition to the foregoing melting gains.

So I now verify in this way my verbal statement of yesterday that the remelting of fine silver does not cause a greater, and probably not as great, a silver loss as the melting of the same amount of silver bullion.

Respectfully,

John W. Wilson
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 3, 1915.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In accordance with the letter of the Director of December 4th, I hand you herewith 25 forms and blanks used by this department, with numbers and notations thereon describing their use:

- No. 1 (Form 963) Register of Gold and Silver deposits, Redeposits, and Miscellaneous bullion
- 2A (Form 143) Receipt for Gold deposits and Redeposits
- 2B (Form 143¹) " " Silver "
- 2C (Form 980B) Certificate Gold Bar delivery memorandum
- 3A (Form 188) Account book of Gold receipts and deliveries
- 3B (Form 183) " " Silver " " "
- 4 (Form 740) Bullion ledger
- 5 (Form 929) Melts for parting -- "Anode sheet"
- 6 (Form 871) Refinery Gold Account
- 7 Blotter A, Scale book used for deliveries, etc.
- 8 " B, Ingot make-up book
- 9A (Form 184) Record of Ingot melting, for Gold and Bronze
- 9B (Form 184) " " " " Silver and Nickel
- 10 (Form 911) Daily Account -- Minor coinage ledger
- 11 (Form 338) Gold deposits sent to Refinery (transcript of No. 3)
- 12 (Form 869) Refinery ledger account
- 13 (Form 889) Department's daily balance
- 14 (Form 773) Settlement sheet
- 15 (Form 413B) M. & R. Vault register (used for Purchased silver)
- 16 (Form 963) Obsolete as to headings; used for record of ingot transfers.
- 17 (Form 413A) M. & R. Vault register (used to record transfers of certificate bars)
- 18 Monthly report of Ingot room operations
- 19 " " Refinery "
- 20 Daily report of Refinery "
- 21 " " Ingot room "

Respectfully,

John Wilson
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 5, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank forms, for the use of the Melting and Refining Department, for the current year:

Form No.	On hand	Number Wanted	Description
889	34	500	Superintendent of Melting and Refining Department's Daily Balance

Sample form is attached hereto.

Respectfully,

Joseph W. ...
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 9, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Referring to the shortage of an ingot of copper in the recent shipment from Tacoma, Wash., I hereby certify that:

On Saturday, April 29th, we received nine wagon loads of copper which was unloaded on fifty-one trucks, and counted and weighed by Farnum St. John, a clerk from my office.

On Monday, May 1st, we received two wagon loads of copper which was unloaded on ten trucks and counted and weighed by myself. Upon counting the copper ingots on the last wagon (before unloading), I remarked to the driver that he was short one ingot, and I then recounted them, and told him that, according to the invoice, there should be 493 ingots on his wagon, but that I could find only 492; and he told me that he had counted them several times and that four men from the office had also counted them and that they could make it only 492.

Our total net weight was 100,040 lbs. The copper was hauled uncovered on open platform wagons, and it rained or snowed most of the day Saturday, so the ingots received that day were wet and must have weighed some heavy. The average weight of the ingots was $18\frac{1}{2}$ lbs., and I understand the weight deducted for the lost ingot was 18 lbs.

Respectfully submitted,

W. W. Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 22, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The work of the Ingot room for the fiscal year 1916 having been completed, I present the following statement showing the amount of minor coinage metals on hand, and the wastage for the year:

	Troy ounces
Copper	2,153,213.37
Nickel	346,426.49
Zinc	10,202.07
Tin	<u>8,839.59</u>
Total	<u>2,518,681.52</u>
Wastage, Nickel Account	10,404.10
Bronze "	<u>8,064.70</u>
Total	<u>18,468.80</u>

Respectfully submitted,

John W. Milson
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 5, 1916.

To the Foreman of the Ingot Room:

Please conform strictly to the following instructions:

Each morning make a personal inspection of every crucible before the same is charged; and make the same inspection of all new crucibles used at any time.

Properly anneal all crucibles before using.

Do not permit any wedging of metal in the crucibles.

Keep an accurate record of the number of crucibles used by each melter and the number of melts made in each crucible.

Respectfully,

Joseph Wilson

Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

October 11, 1916

Hon. Thomas Annsar,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following books and forms:

Book, Form 871, Record of Refinery Gold Melts

on hand, 1; number wanted, 3.

Blank, Form 929, Melts for Parting

on hand, 300; number wanted, 1000.

Respectfully,

Joseph Wilson

Superintendent M. & R. Dept.

2 Samples attached.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

October 13, 1918.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I have made a careful estimate of the minimum time consumed in making the various denominations of ingots under existing conditions, basing the same on the use of the Gautier No. 80 Special crucible, with a liquid capacity of 17 quarts.

The use of Japanese crucibles would increase the time, on account of their thickness, approximately 15 minutes for each melt, and the present size (Jap. No.100) would decrease the weight of the melt (for instance, on nickel, about 140 ounces).

Gold

Double Eagles:

Ingots, 42; average weight of melt, 6175 Troy ozs.

Eagles:

Ingots, 52; " " " " 6041 " "

Half Eagles:

Ingots, 69; " " " " 6070 " "

Quarter Eagles:

Ingots, 88; " " " " 6044 " "

Number of melts in 8 hours, 2

" " " " 12 " 4

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Silver

Half Dollars:

Ingots, 53; average weight of melt, 4061 Troy ozs.

Quarter Dollars:

Ingots, 66; " " " " 4080 " "

Dimes:

Ingots, 100; " " " " 4033 " "

Number of melts in 8 hours, 3

" " " " 12 " 5

Nickel

Ingots, 56; average weight of melts, 3387 Troy ozs.

Number of melts in 8 hours, 2

" " " " 12 " 3

Bronze

Ingots, 45; average weight of melts, 3595 Troy ozs.

Number of melts in 8 hours, 2

" " " " 10 " 3

" " " " 13 " 4

The foregoing estimate on Dimes is a little close, on account of the additional time consumed in pouring such a large number of ingots.

Respectfully,

Joacumilson
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 21, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I have made a careful estimate of the minimum time consumed in making the various denominations of ingots under existing conditions, basing the same on the use of the Gautier No. 80 Special crucible, with a liquid capacity of 17 quarts.

The use of Japanese crucibles would increase the time, on account of their thickness, approximately 15 minutes for each melt, and the present size (Jap. No. 100) would decrease the weight of the melt considerably.

Gold

Double Eagles:

Ingots, 42; average weight of melt, 6175 Troy ozs.

Eagles:

Ingots, 52; " " " " 6041 " "

Half Eagles:

Ingots, 69; " " " " 6070 " "

Quarter Eagles;

Ingots, 88; " " " " 6044 " "

Number of melts in 8 hours, 2

" " " " 9 " 3

" " " " 12 " 4

" " " " 15 " 5

" " " " 17 " 6

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Silver

Half Dollars:

Ingots, 55; average weight of melt, 4061 Troy ozs.

Quarter Dollars:

Ingots, 66; " " " " 4080 " "

Dimes:

Ingots, 100; " " " " 4033 " "

Number of melts in 8 hours, 3

" " " " 10 " 4

" " " " 13 " 5

" " " " 15 " 6

Nickel

Ingots, 56; average weight of melt, 3387 Troy ozs.

Number of melts in 8 hours, 2

" " " " 12 " 3

Bronze

Ingots, 45; average weight of melts, 3595 Troy ozs.

Number of melts in 8 hours, 2

" " " " 10 " 3

" " " " 13 " 4

The foregoing estimate on Dimes may be a little close, on account of additional time consumed in pouring such a large number of ingots.

Employees: Running 1 furnace requires 4 men

"	2	"	"	5	"
"	3	"	"	6	"
"	4	"	"	8	"
"	5	"	"	9	"
"	6	"	"	10	"

Respectfully,

John W. Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 28, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I respectfully present the following report on the Japanese crucibles:

We began the use of these crucibles on October 6th in Refining and Ingot melting rooms. The crucibles are very nicely made, and the graphite in them seems to be of very good quality, but they appear to be lacking in a suitable binding material. The binder, which is some form of a silicate, works to the outside surface, forming a scale which sloughs off from time to time, and soon weakens the crucible to such an extent that it is liable to rupture at any time, from the internal pressure of the metal; and as we have been unable to determine the time when the crucible becomes so weakened as to be liable to such rupture, it is not safe to use them after five or six melts.

In the Refinery, we carefully tested six crucibles; the annealing being uniform, and consisting of placing the crucible in a cold furnace and gradually heating to a cherry red, time one hour, then shutting off the fire and allowing the crucible to remain in the same furnace for sixteen hours longer. The loss in weight from annealing varied from 3.1 to 14.5 Troy ounces.

The first two regular melts brings out the silicate on the exterior surface and causes some scaling. The second period, third and

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

fourth melts, shows heavy scaling, the scale being practically all silica, a microscopical examination of same showing very little graphite. The third period, fifth and sixth melts, caused additional scaling, the crucible now being much softened, with a dead ring, and an examination of the cross section with a microscope shows the absence of practically all binding material.

The first crucible we tested ruptured on the sixth melt, a piece about six by eight inches having been pushed out of the side, the metal content going down into the furnace.

The silica that exudes from the crucible occasionally runs down and cements the crucible to the pedestal on which it rests.

The Refinery secured 39 melts from 6 crucibles, with the possibility of using some of them for an additional sweat melt.

The results in the Ingot room, running on Nickel ingots, were a little better than in the Refinery, as the Melters secured 44 melts from 6 crucibles. However, they had one peculiar experience, to wit: The Ingot crucibles were placed on top of operating furnaces at noon October 5th, and at 5 p.m. of the same day were placed in furnaces (top down) on top of crucibles that had been in use during the day, and remained there until 7 a.m. October 6th, when they were put down in the furnaces for regular use and heat turned on gradually. After 20 minutes one of the crucibles exploded with a loud report; the explosion did not affect the inside of the crucible, but blew off the outside in flakes some of which were a half inch thick.

The thickness of the Japanese crucibles caused an increase of

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - S

about fifteen minutes in time to each melt.

From the results stated, the Japanese crucibles we tested appear to be quite unsatisfactory.

Very respectfully submitted,

Forwille

Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 3, 1918.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I respectfully present the following statement concerning operations in the Refining department of the Denver Mint:

All bullion for the Refinery is divided into three classes; first, Chloride bullion; second, Gold Anode bullion; and third, Silver Anode bullion. The first class is all bullion that will make up to .930 plus in gold, with as little base as possible, and as its name indicates, is used exclusively for the manufacture of anodes for the gold chloride cells. The second class is all bullion (exclusive of the first class) that will make up to .880 plus in gold and 100 parts silver, and is used for the manufacture of anodes for the gold cells. In the fiscal year 1916 less than 12% of the bullion sent to the Refinery was comprised within the first and second classes. The average fineness of the first class was, Gold, .9351; Silver, .0570; Base, .0079. The second class was, Gold, .8901; Silver, .0982; Base, .0117. The third class of bullion includes everything below the second class, and is made up at the present time in melts containing approximately 380 parts gold, 520 parts silver, and 100 parts base, and is used to make anodes for the silver cells. The average fineness of the third class bullion used in said fiscal year 1916 was, Gold, .3766; Silver, .5306; and Base, .0928. In said fiscal year 1918, we eliminated 20,179 pounds of base metal from all classes of bullion in our Refinery operations.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Melts of the first and second classes weigh close to 6,000 Troy ounces; but on account of the increased amount of silver and base in the third class melts, they can be made up to only about 5,650 ounces. These melts are all weighed and checked by the Superintendent of the Melting and Refining department, or his representative, and by the Foreman of the Refinery, the latter giving his receipt for the number of bars and weight of bullion.

In the Refinery the first and second class bullion is melted and cast into anodes, 8"x3 $\frac{1}{2}$ "x $\frac{3}{8}$ ", each, weighing about 70 ounces, the top being an inverted V shape, with an immersion depth of about 7 inches. The third class bullion is cast into anodes, 18"x2 $\frac{3}{4}$ "x $\frac{3}{8}$ ", and weighing about 116 ounces each.

Four granulation assay samples are originally taken from each melt, but before delivery to the Assayer, the first and third are combined, and as well the second and fourth. The crucible is drawn after each melt, to prevent any metal being misplaced so as to affect that or a subsequent melt. After melting the resulting anodes are carefully weighed, together with any scrap that appears and a record is duly made of the same. The anodes are then placed -- each melt on a separate shelf -- in the Refinery vault, where they remain until removed for use in the cells.

All gold cells are of porcelain, 20"x16"x14", with a capacity of about 30 liters of solution after equipping with anodes and cathodes.

We start the chloride cells with a solution consisting of about 60 per cent. hydrochloric acid and 40 per cent. hot water, and after

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 4

chloride and increase the amount of foul solution.

The current density used in these cells is about 30 amperes per square foot of cathode surface, with an electromotive force of about one-half volt per cell, direct current, together with the addition of an alternating current of about ten volts -- the latter being varied according to the silver content of the anodes.

The gold cells produce from 8,000 to 10,000 ounces of slimes per week, running from 200 to 450 parts gold and from 500 to 750 parts silver, the fineness being governed by the character of the anodes used. Ordinarily the amount of gold in the slimes is about 7 per cent. of the amount deposited at the cathode -- under very favorable conditions it is less.

The amount of gold deposited is about 200 ounces per hour.

The silver cells are large earthenware tanks, size, 2'x2'x4', with a capacity of about 400 liters liquid measure. The electrolyte used in them is made up of 20 liters of silver nitrate, 5 liters of free nitric acid and water, this giving a solution that will assay about 3 per cent. silver and 2 per cent. free acid.

The current density used on these cells is about 12 amperes per square foot of cathode surface, with an electromotive force of about one volt, direct current, to each cell.

The daily production is about 5300 ounces of fine silver, varying in amount, however, according to the quality of the anodes.

The slimes amount to about 1000 ounces per day, practically one-half of which is used in making silver nitrate, and the balance is com-

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

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bined with reduced gold and silver slimes, anode "bone" (from the silver cells) and sweat kings in the making of silver anode melts. Ordinarily the amount of silver in the slimes is about $1/6$ to $1/5$ of the amount deposited at the cathodes, and it is all very useful for the purposes indicated.

The wash water from fine silver, anode gold, silver slimes, and spent electrolyte of the silver process containing silver nitrate, is converted to the chloride state by salt solution. The silver chloride thus recovered is sufficiently washed with water to remove the last trace of copper or free acid, and is then transferred to a lead-lined vat, there mixed with the gold cell slimes (from which all gold chloride has been thoroughly washed) and reduced to a metallic state with cast iron borings. After the reduction is complete, any excess iron remaining is taken up with hydrochloric acid.

The thus reduced slimes are then transferred to a filter and hot water washed until they show no lead by the sulphuric acid test, and but a trace of iron by the potassium ferri cyanide test. The ferrous chloride produced in the foregoing reduction is very efficient in reducing gold chloride solutions.

All wash waters are carefully tested and filtered before leaving the Refinery.

Until about one year ago, we had always used zinc to reduce these slimes; but the price of zinc became so high that it was necessary to secure some other method. The Australian mint had used iron for that purpose; and after a little experimentation it proved such a success in

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

our work that we expect to continue its use indefinitely. The reduced slimes, after thorough washing, are pressed into a cake in a hydraulic press, then alloyed with silver slimes, melted, and cast into silver anodes.

The electrolyte in both gold and silver processes is carefully tested each day, by the following processes:

For the gold electrolyte we use a standardized solution of ferrous ammonium sulphate for the titration, with ferri cyanide on a spot plate as an indicator for gold; and a standardized solution of copper ammonium sulphate with methyl orange as an indicator for free hydrochloric acid.

For the silver electrolyte we use a standardized solution of potassium sulpho cyanate with ferric sulphate as an indicator for silver and a standardized solution of caustic potash with methyl orange as an indicator for free nitric acid.

The gold solutions are all precipitated with copper and ferrous sulphate or ferrous chloride, then allowed to stand for 12 hours, and after being tested are drawn off through a filter box to the copper tanks, which contain an excess of scrap iron, where the solution is boiled by means of a steam jet. After the solution gets cold and thoroughly settled, it is drawn off by syphon through a filter cloth to a waste solution line which discharges into a tank situated underground in the alley-way in the rear of the Mint. This tank contains a quantity of scrap iron, and is equipped with the necessary baffles to get the best results.

THE MINT OF THE UNITED STATES AT DENVER,

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The waste solutions from the silver process are drawn off in like manner through filter cloths and discharge into the same alley tank, the contents of which are frequently tested for values.

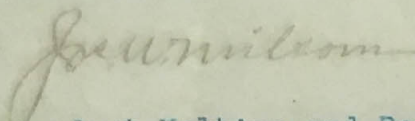
All our solutions are handled by gravity, and all but one of our refinery tanks have abandoned their costly lead linings. We now use tanks made of pine wood.

We use approximately 35 pounds of hydrochloric acid for each 1000 ounces of fine gold produced, and about 40 pounds of nitric acid for each 1000 ounces of fine silver produced.

We do not sack our silver anodes, nor are we bothered with gold in our fine silver; our success in this matter is due to the make-up of the anodes and our method of filtering the electrolyte, which is by sinking a filter box in the solution, and the agitation of the solution causes its constant flow through said filterbox which is made of pine wood with many holes bored in it and lined with cheese cloth.

Our present methods have done away with all deleterious fumes and gases in the Refinery; in fact, the air is very little different from that in other rooms of our institution.

Respectfully,



Superintendent Melting and Refining Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 3, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In re Japanese crucibles:

On last Saturday we started to anneal one of the Japanese unglazed (No. 60, I think) crucibles, by placing it in a furnace at 5 o'clock p.m., and turning on a very low heat which was gradually increased for two hours until the crucible showed cherry-red. The furnace was then closed and remained so until 7 o'clock Monday morning, at which time we charged the crucible with copper and when melted cast it into shoe moulds. We then placed the hot crucible in front of an electric fan until it partially cooled, when we broke it up for examination.

Before breaking, it looked pretty good, but after breaking it we found that the usual Jap. scale had formed on the outside a little more than an eighth of an inch in thickness; this scale seemed to be largely composed of silica and graphite ash, some of the former remaining unfused and very few minute particles of the latter being in a live condition. Inside of the scale, the graphite appeared to be unaltered, but it showed rather coarse silica in considerable amount.

Further use of said crucible, I feel sure, would have produced the same general result as with the glazed Jap. crucibles -- the tests of which I reported to you on the 28th ult.

We then attempted to anneal the other unglazed Jap. crucible with

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

the following result:

We started as we did with the first one, by putting it in the furnace and turning on a very low heat, and in less than ten minutes it began to break off in irregular slabs from the outside, so we shut off the fire and ended the test. The piece that I called your attention to in my office on Wednesday last was from this crucible, and comprised a part of the side of the crucible and a part of the bottom, and was in one place over half an inch thick; it contained very much silica and in a coarser form than any other we have tested.

The results obtained on these unglazed crucibles confirms the opinion I formerly expressed that all the Japanese crucibles that we have tested have proved unsatisfactory.

Respectfully,

Jacobsen
Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT

Nov. 9th, 1916.

Thomas Anheer,
Superintendent.

Sir:

Following is the statement of output of the various descriptions of ingots resulting from continuous days runs each kind following in the same furnace. The oil consumption is as given by Mr. White.

GOLD INGOTS:

5 Melts - 6,150.00 lbs.

12,450.00 lbs. - 7 hours - Oil consumption $4\frac{1}{2}$ gals. per hr.

SILVER INGOTS:

5 Melts - 4,050.00 lbs.

20,250.00 lbs. - 10 $\frac{1}{2}$ hours - Oil, $4\frac{1}{2}$ gals. per hour.

COPPER INGOTS:

4 Melts - 3,600.00 lbs.

14,400.00 lbs. - 10 hours - Oil, $4\frac{1}{2}$ gals. per hour.

NICKEL INGOTS:

3 Melts - 2,450.00 lbs.

10,350.00 lbs. - 11 hours - Oil 5 gals. per hour.

Respectfully,

J. M. Hebrich,
For Asst. M. R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 15, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

If any "per ounce" cost is required on Refinery work, it should be based not only on the ounces of fine metal produced, but as well on the ounces of base metal eliminated, as the latter largely increases the amount of acid and electricity required, and as well increases the cost in other ways; and so, for fair comparative purposes, this cost per ounce of base metal eliminated must be shown.

It would help some if the crucibles were increased a little in size so as to enable us to use silver anode melts of 6,000 ounces, with 10% base, so that each melt would furnish a sufficient number of anodes to fully supply one silver cell -- then there would be no admixture of anodes of differing finenesses in any cell.

If a year's supply of crucibles were kept on hand, it might be beneficial, as I am advised that time aids in curing graphite goods.

Why not re-establish the Parting and Refining Fund? It would not increase the expense to the Government, and yet it would relieve the Mints of one element of uncertainty regarding the amount of the Contingent Fund that must be held from use until the end of the fiscal year to meet any possible wastage that may occur in the Refinery work; and as in our own case has thus prevented the purchase of necessary supplies in the latter part of the year. Further, said Contingent

THE MINT OF THE UNITED STATES AT DENVER,
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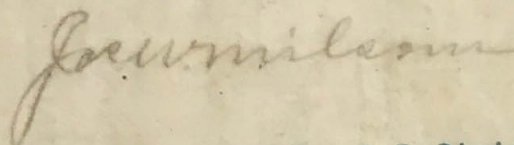
Superintendent - 2

Fund is required to meet the cost of alloy copper, the amount of which depends entirely upon the coinage of gold and silver; and it is not hard to imagine a condition where a rush of such coinage, with copper at its present price, might use practically all of said Fund.

We went into settlement June 30th last with silver bullion containing 566,000 ounces of silver, and in addition we have had all silver bullion received since said date; and yet on this day we have only 38 bars of silver bullion not made up, and they contain, in silver, from 204 to 983 ounces each.

Nearly all of our bullion is of such a low grade in gold that it has to pass through the silver cells, and our receipts of silver bullion are not nearly sufficient to keep us going with the ten cells we have in use; and in a very short time, unless the deposits of silver bullion increase, it will be necessary for us to use mint fine silver in making up a part of our silver anode melts.

Respectfully,



Superintendent Melting & Refining Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 16, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In the fiscal year 1916, the Ingot room made the following melts of ingots: Silver, 341; Nickel, 226; Bronze, 1087; Total, 1654; and in said year used the following No. 80 crucibles: 55 Gautier, 148 Dixon, 17 S XXX; Total 220; making the average number of melts per crucible 7.52.

In addition to the foregoing melts, when in the opinion of the foreman it was deemed unsafe to use the crucible for further regular work, it was used for melting alloy (tin and zinc) and in all sweating purposes.

In the last month of the present calendar year, the Ingot room made the following melts: Silver, 208; Bronze, 137; Nickel, 70; Total, 415; and in doing so used 34 crucibles, making an average of 12.21 melts per crucible. This high average is due largely to the fact that one-half of the melts were of Silver ingots.

Refinery

In the fiscal year 1916, the Refinery made the following melts: Fine silver, 350; Fine gold, 246; Gold anodes, 68; Silver anodes, 587; Experimentals, 631; Settlement, 45; Miscellaneous, 50; Total, 1997; and in doing so used the following No. 80 crucibles: 150 Gautier, 94

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Dixon, 20 S XXX; Total, 264; making the average number of melts 7.56 per crucible. These crucibles were further used for sweating purposes after it was deemed unsafe to use them further in regular work.

In the present fiscal year of 1917, up to November 1st, the Refinery used 64 No. 80 crucibles to make 580 melts, being an average of 9.06 melts per crucible.

The foregoing account includes 27 broken crucibles for the year 1916, and 5 broken ones for the present fiscal year, 1917.

Respectfully,

Joseph M. L. ...

Superintendent Melting & Refining Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 22, 1916.

Mr. H. F. Coors,
Manager, The Herold C. & P. Co.,
Golden, Colo.

Dear Sir:

Upon receipt of the samples of your wares, I divided the Evaporators, etc., by giving a part of them to the Assayer, and retaining the rest in the Refinery laboratory for our own use. I also requested Mr. Whitehead to proceed immediately to test the porous cells; but, as you know, that test will take considerable time. However, I shall take pleasure in advising you of the results obtained as soon as the tests are concluded, which, I hope, may be three or four months hence.

Sincerely yours,

J. W. Wilson

Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

December 8, 1918.

Mr. E. P. Loech,
Chief Clerk, U. S. Mint,
Denver.

Sir:

Concerning the weighing of Tin and Zinc from the Bogue-Wensley Lead Company, I respectfully present the following statement, from my memorandum book, used in the weighing of such material:

Nov. 4th, I weighed 10 pigs of Tin, 1141 lbs.; and 29 slabs of Zinc, 911 lbs. Mr. Buck, the receiving clerk, checked these weights. They were within 1 and 2 lbs., respectively, of the driver's ticket.

Nov. 11th, Mr. Buck weighed five drafts of Zinc, aggregating 2023 lbs. I had nothing to do with this weighing.
On the 13th, I weighed two drafts of Zinc, aggregating 2311 lbs. Mr. Leykam, guard, checked the weights. These seven drafts total 4334 lbs. which is 54 lbs. less than the driver's ticket (No. 4938) calls for. No record was kept of the number of slabs.

On Nov. 18th, I weighed 10 pigs of Tin, 1117 lbs., within 1 pound of the driver's ticket. I also weighed 96 (not 96½) slabs of Zinc, 3003 lbs., being 18 lbs. short of the driver's ticket (No. 5141). Mr. Buck checked this weighing.

Nov. 28th, I weighed 82 pigs of Tin, 5807 lbs., being 39 lbs. less than driver's ticket (No. 5395). Mr. Buck checked these weights. On your suggestion, I had Mr. Tinker clean out beneath the scale bed, after which he and I reweighed the tin without changing the figures in any particular.

December 10, I weighed 118½ slabs of Zinc, 3673 lbs., being 18 lbs. less than the driver's ticket (No. 3502). Mr. Buck checked these weights with me.

Respectfully,

Jarvis St. John

Clerk.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 13, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The two samples of porous clay cells received from the Herold C. & P. Co. of Golden, have been used with the following results:

No. 1 was put into use on Nov. 18th; in a few days it commenced to show small particles of gold on corners and bottom edge; then when it short-circuited the electric current, on Dec. 1st, it was taken out.

No. 2 (the cell with the broken top corner) was put into use on Nov. 21st, and taken out this morning; it lasted a little longer than No. 1, that being the only difference between them.

The first shipment of Golden porous cells (other than experimental ones) was received on Nov. 12th, 1914, and contained 27 cells; they lasted from three to four months each, and were superior to the German production. The second shipment was the completion of our original order for 100 cells, and contained, I think, 73 cells. They were quite different from the first shipment, in being much softer and not standing up well in use.

From a conversation I had recently with Mr. Coors, I am sure he would be glad to go into this matter to any extent necessary to perfect their product.

Respectfully,

James M. Brown
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 18, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In re New York Annual Cost Form:

For comparative purposes it is useless, because it does not differentiate between the several departments in any way, so that it would be impossible to determine therefrom the cost per ounce of anything.

Line No.9 of "Statistics" says "Metal sent to Refinery on which charges were collected;" but nowhere is there any item showing the amount of metal without charges (which in the last Director's report was, at the New York Assay office, 2,488,739.365 ounces of gold; and the amount with charges being only 1,627,092.151 ounces); so that the next line (No.10), "Fine gold produced," would far exceed the total amount shown as having been sent to Refinery.

Line No.2 of "Revenues" says, "Parting and Refining charges," but does not indicate whether said charges are on the bullion received or on bullion operated upon; and there must be some and may be a vast difference between the respective amounts.

In my opinion, it is absolutely necessary for each department to be individually represented in the annual cost report, as in that way only can any possible comparison be made.

Respectfully,

Joseph W. Sullivan
Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT.

December 22, 1916.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Herewith I submit a proposed form for the annual report of the Melting and Refining department, which combines the cost feature with that of operations, and with sufficient detail to enable each Mint to understand the operations of other like institutions and make intelligent comparisons both as to cost and work. I think the comparative feature is absolutely necessary to produce the greatest efficiency in our work, because if any other report shows that we are below the institution making it, in any line, we will speedily apply our best efforts to improve our work, and in this way alone the comparative feature may become of much benefit to all the institutions.

Costs:

The form as to costs is practically the same for each of the three divisions -- Refinery, By-Products, and Ingot work; so I shall cover only that part relating to the Refinery, and the remarks thereon can easily be applied to the other two divisions.

- Line 1. Administration -- Salaries. This shows the amount of the salaries of the M. & R. General department.
- Line 2. All labor.
- Line 3. Assays -- amount charged by the Assayer for all Refinery assays.
- Line 4. Maintenance and Repairs -- amount charged by the General department for all shop work, etc., throughout the year.
- Line 5. Sweeps Cellar -- amount charged by the General department for all sweeps cellar costs pertaining to Refinery work.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Lines 6 & 7. Electric Power and Electric Light -- this shows the number of K.W. and the cost of same under each head in the next to last column, but the total of both is carried into the right column, so as to show the cost of all electricity in one item.

Lines 8 to 14, inc. Covers all supplies; Acids, crucibles, and fuel oil are shown separately, the amount and unit price of each being given; the sub-totals are placed in the next to the last column, and the grand total of all supplies is carried into the right column as one item.

Line 16. New Equipment has never been included in operating costs and therefore is set apart.

Statistics:

Debit: The first and second items are bullion "without charges," but consisting only of gold, .992 and over and silver, .998 and over; the gross is entered in the first column, the fine ounces of each in the second column, and the total of the fine ounces in the third column.

The third item includes all other bullion "without charges," Assayer's bars, sweeps bars, Superintendent's bars, Coiner's bars, etc. The gross is entered as one item in the first column, the fine ounces of gold and of silver each entered in the second column, and the total in the third column. The total of these two items, as entered in the third column is now carried to the fourth column, thus showing in one item the amount of fine ounces of gold and silver sent to the Refinery in all kinds of bullion "without charges."

The fourth and fifth items include all bullion, both gold and silver, "with" charges; the gross is entered in the first column, the fine ounces in the second, and the total in the fourth column.

Addition of the two items in the fourth column gives the complete debit account of the Refinery, and is exhibited on a double-ruled "total" line.

Credit: The first and second items show the fine gold and silver returned by the Refinery; gross in the first column, fine ounces in the second, and total in the fourth.

The third item includes all settlement bullion returned by Refinery, and is divided into three classes -- gold, silver, and base bullion; gross in the first column, fine ounces in the second, and total in the fourth.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

Statistics

Credit: An addition of these two items in the fourth column gives the complete credit account of the Refinery, and is exhibited on (cont'd) a double-ruled "total" line.

The difference between the Debit and Credit Totals shows the Surplus or Wastage of the Refinery; and a suitable place is provided to enter the same, so that it will show in the second column the fine ounces of gold or silver, and in the fourth column the total ounces.

Base
Metal The amount of base metal contained in the bullion operated upon has much to do with the expense of parting the metals, as it increases the amount of acids, etc., and causes much additional work, and also slows down the operations of the cells. Therefore, as a fair basis of comparison on Refinery work, the cost per ounce of all base metal eliminated should be carefully computed and exhibited on the report. The remainder of the form on this page is self-explanatory.

By-Products:

This part of the form explains itself quite fully. I have added one new feature only -- that of fineness -- which is to be determined by the Assayer and shown on the report, thus completing the statement of facts necessary to a thorough comparison of the work along this line.

Ingot
Room This part of the form is also self-explanatory. The statistics are based on the amount of good ingots produced, because the production of ingots is the sole object of the Ingot Room, and is the only item of benefit to coinage operations; and because that is the only definite figure that will furnish a fair basis for comparison, as it entirely eliminates the uncertainty that would exist if the amount of metal operated upon were made the basis, on account of the feeding in of tops during the work, and of melts condemned or remelted.

As to the difference between the amount operated upon and the amount of good ingots, it is sufficiently exhibited in the fourth column which shows the percentage of good ingots to the amount operated upon.

Respectfully submitted,

Joe W. Milson
Superintendent Melting & Refining Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 5, 1917.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

About the first of January, The Herold C. & P. Co. of Golden, sent us two sample porous cells for testing as to quality. The time required to thoroughly test a porous cells is its lifetime in actual use, which ought to be at least three or four months; but unfortunately for these samples, the test of them is now completed.

Sample "T" was put in a chloride cell on January 10th, and taken out February 3d. Sample "B" was put in January 11th, and taken out January 29th.

Both of the samples checked badly and collected considerable gold on the exterior surface. All of the porous cells used in the past year are apparently too soft. Out of the first lot of porous cells furnished us by the Herold Company some were operated continuously for seven or eight months without checking or gathering any gold; in fact that first lot contained the best cells we ever used.

Respectfully,

John M. Bloom
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

March 9, 1917.

The Herold China & Pottery Co.,
Golden, Colo.

Gentlemen:

We received the four graphite crucibles which were shipped the 21st ult. A few days later we received the four porous cells. Three of the porous cells are in use, and up to the present time appear to be doing very well. We are putting the crucibles through a course of preliminary annealing, and in the near future we shall commence testing them for stability.

Respectfully,

John Wilson
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

March 30, 1917

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following books and forms:

Books

Form 184, Record of Ingot Melting.

✓ Number on hand, 2; Number wanted, 4

Form 184, M. & R.'s Record of Silver Ingot Melting.

✓ Number on hand, 2; Number wanted, 4

Form 871, Refinery Gold Account.

✓ Number on hand, 3; Number wanted, 4

Forms

Form 773, Settlement Bullion: on hand, 300; wanted, 1000

✓ Form 889, M. & R. Daily Balance; " 25; wanted, 500

✓ Form 963, Deposits Del'd M. & R.; " 200; wanted, 500

Self-acting Binder (Franz Muller, Leipzig 40) to hold Form 963.

On hand, 0; wanted, 3

3 samples enclosed

Respectfully,

Joseph Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 12, 1917.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following wood supplies
for the Refinery:

- 1 Fine silver box, 6' long, 32" wide, and 18" deep, iron-
banded, with false bottom perforated, for drainage
purposes.
- 2 Perforated baskets for copper tank.
- 10 Racks for silver cells.
- 32 " " gold "
- 8 " " chloride "
- 100 Rods " silver "
- 12 Baskets " " "
- 12 Paddles " " "

To be furnished as soon as convenient, so they may be painted
and dried, ready for use July 1st.

Respectfully,

Joel Wilson
Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

April 23, 1917.

Hon. Thomas Arnear,
Superintendent, U. S. Mint,
Denver.

Sir:

About 11 o'clock in the forenoon of Monday, April 23d, 1917, W.M. Bush, foreman of the Ingot room, came into my office and suggested that the condemned half dollar coin received that morning (for melting on Tuesday), be reweighed after working hours, as he was convinced that E. P. Schell, helper in the Make-up room, had taken some of the coin during the transfer from the weighing pan to the boxes after the coin had been weighed. The charge was so grave that I was anxious to have some corroborative evidence before presenting the matter to you; so I made the necessary arrangements, and at about 4.20 p.m., after Schell had left the mint, Mr. Hettrich reweighed the coin, Bush and Gray assisting in handling it under my direct observation every moment of the operation. During the time we were weighing the coin, Farnum St. John passed through the room, H. K. Whitehead looked in for a moment, and E. P. Leech came in and was present for a short time, but none of them was advised regarding the work we were doing.

When we received the coin in the morning, it weighed 15,239.05 gross ounces; and when we reweighed it in the evening, it weighed 15,203.10 gross ounces, showing a loss of 35.95 ounces, notwithstanding the fact that during the time intervening between the weighings, the coin was stored in Vault G (off the Make-up room), which was locked all day except a few minutes when it was opened to run in some trucks

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

carrying million.

I enjoined the strictest secrecy on Hetrich, Bush, and Gray, and each assured me that he would maintain absolute secrecy regarding the whole affair.

I then went home and after carefully considering the matter, I called you on the 'phone, and you consented to walk over to Colfax avenue; and in a very few minutes I met you at the corner of Corona street, and we walked down Colfax avenue to the Public Library, during which walk I informed you fully of all the facts in the case.

Respectfully,

Joseph Wilson

Supt. Melting and Refining Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

April 30, 1917.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I herewith present a record of the melting loss of silver in making silver ingots, on each day that either "uncurrent coin" or "condemned coin" was used in the fiscal years 1915, 1916, and 1917, to date; except Nov. 16 and 19, and Oct. 19 and Dec. 30 in year 1916, and January 6, 13, and 30, and March 1, in year 1917, on which eight days so excepted, one or more broken crucibles prevented determination of melting loss.

The record shows in detail the date, number of melts, apparent loss, weight of ingots, loss per melt, loss per 1,000 ounces of ingots produced, and the average loss in each of the said fiscal years.

Respectfully,

Frederick M. ...
Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Page 2

Silver ingot melting losses on days that Condemned Coin and Uncurrent Coin was used, Fiscal years 1915, 1916, and 1917.

No Uncurrent Coin melted in Fiscal year 1915.

Condemned Coin, 1915.

Date	No. of Melts	Wastage	Wt. of Ingots	Loss per Melt	Loss per 1000 ozs. of Ingots
1915					
June 4	8	25.23	32,426.70	3.15	0.77

Uncurrent Coin, Fiscal, 1916.

1916					
Jan. 24	9	31.38	36,537.25	3.48	0.85
June 14	6	24.71	23,190.00	4.11	1.05
15	3	13.65	12,594.40	4.55	1.08
Total	18	69.74	72,321.65	3.87	0.96

Condemned Coin, Fiscal, 1916

1915					
Sept. 18	3	9.43	11,478.10	3.14	0.82
Oct. 4	6	16.33	23,153.90	2.72	0.70
12	6	24.00	23,150.75	4.00	1.03
30	6	16.07	23,916.80	2.67	0.67
Nov. 27	6	13.22	24,354.05	2.20	0.54
1916					
Jan. 25	9	25.57	36,686.50	2.84	0.69
Total	36	104.62	142,740.10	2.90	0.73

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Page 3

Uncurrent Coin, Fiscal, 1917, to May 1

Date	No. of Melts	Wastage	Wt. of Ingots	Loss per Melt	Loss per 1,000 ozs. of Ingots
1916					
Oct. 17	20	58.82	81,549.95	2.94	0.72
18	20	59.05	81,382.50	2.95	0.72
20	20	75.45	81,737.80	3.77	0.92
21	20	63.13	81,627.25	3.15	0.77
23	20	134.93	81,703.80	6.74	1.65
24	20	35.03	81,764.40	1.75	0.42
1917					
Feb. 26	9	56.11	36,961.20	6.23	1.51
27	9	43.64	36,863.20	4.84	1.18
Mch. 12	9	49.82	36,878.80	5.53	1.35
13	9	43.70	36,926.25	4.85	1.18
14	9	53.63	36,857.60	5.95	1.45
16	9	40.92	36,906.20	4.54	1.10
17	9	62.83	36,777.90	6.98	1.70
19	9	60.38	36,904.85	6.70	1.63
24	9	61.13	36,851.20	6.79	1.65
26	9	60.78	36,848.25	6.75	1.64
27	9	73.01	36,889.90	8.11	1.97
Total	219	1,032.36	895,431.05	4.71	1.15

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Page 4

Condemned Coin, Fiscal, 1917, to May 1

Date	No. of Melts	Wastage	Wt. of Ingots	Loss per Melt	Loss per 1,000 ozs. of Ingots
1918					
Oct. 28	10	90.19	40,976.85	9.01	2.20
Nov. 22	20	28.17	82,203.80	1.40	0.34
Dec. 2	20	54.29	82,240.60	2.71	0.66
5	20	32.34	82,299.00	1.61	0.39
13	16	41.60	64,966.30	2.60	0.64
27	10	26.89	40,722.10	2.68	0.66
28	10	64.05	40,874.70	6.40	1.57
1917					
Jan. 3	9	31.74	36,540.20	3.52	0.86
12	6	41.85	24,657.75	6.97	1.69
Apr. 3	9	50.16	36,815.35	5.57	1.36
4	9	38.14	36,461.25	4.23	1.04
11	9	58.68	36,532.75	6.52	1.60
17	1	69.71	36,728.45	7.74	1.89
24	9	67.50	36,841.05	7.50	1.83
Total	166	696.31	678,660.15	4.18	1.02

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 18, 1917.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I present the following facts concerning the four porous cells furnished us by the Herold C. & P. Co., in the latter part of February of this year:

A and B were put to use in the chloride cells on February 28th, C on March 8th, and D on March 10th; and they were all in commission and working at the time we shut down, on April 10th, so that it was impossible to make the test conclusive.

On March 23d, cell A commenced to show slight signs of a deposit of gold near the surface of solution, but not sufficient to justify us in discarding it.

B cell appeared to be the best of the four.

In my opinion, the only thing necessary to produce a cell that will be entirely satisfactory is to have them made the same as these were, but baked just a little harder; and I recommend that when placing the next order with said Herold C. & P. Co., they be so advised.

Respectfully,

Joseph Wilson
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

May 19, 1917.

Hon. Thomas Amear,

Superintendent, U.S. Mint, Denver.

Sir:

On February 21st, we received from The Herold C. & P. Co., four No. 60 graphite crucibles to be tested in our work. They were designated by numbers; and one, two, and four broke in the first annealing.

No. 3 annealed all right, and was used in making a sweat melt of shimmings from slime melts. It was run down with borax, soda, and nitre; yet the inside of the crucible gave very little evidence of scorification -- no more than is usual -- and the outside did not scale, although it was subjected to a high heat (about the maximum in Refinery melting) for two and a half hours.

It was impossible to make a satisfactory test in any of our furnaces on account of their depth, which necessitated building up with two fire-brick on top of the pedestal and a split brick on top of the fire-brick, and that raised the crucible so high that the greater part of it was above the point of fuel combustion; in fact, the split brick which was directly under the crucible was fused in the operation.

I regret exceedingly that this No. 3 crucible was not of a size that would enable us to use it in our regular work and get a complete test by running out its life, because I am of the opinion that it is a good crucible, and gives promise of satisfactory results in continued use.

Respectfully,

Joe W. Mills
Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 2, 1917.

The Director of the Mint,
Washington, D. C.

Sir:

At the request of Mr. F. P. Dewey, chairman settlement commission, I am presenting herewith the following bullion samples:

Mint Assay No.	Description	Weight
3778	Golden Cycle -- nickel base	.50
3779	" "	.50
3800	Maxwell Land Grant, New Mex.	1.59
3848	U.S. Gold Corp., Boulder, Colo.	1.67
3914	Conrey Placer, Montana	2.01
3928	Maxwell Land Grant, New Mex.	1.78
Mass Melts by Mr. Dewey, No. 5		1.50
Do	6	.72
Do	7	1.81
Do	8	1.72
Grains Bar No. 7, Supt.'s bullion, June 6-30		.94
Assayer's Chip bar No. 1,	Do	<u>1.95</u>
		16.69

Respectfully,

Joseph W. Milson
Supt. M. & R. Dept.

Received the above, July 2, 1917.

Frederic P. Dewey
Ass. B.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

August 1, 1917.

Hon. Thomas Annear,
Superintendent U. S. Mint,
Denver.

Sir:

Herewith I present copies of Form 900, sheets 1 and 2, corrected as suggested by the Director. Under the old form 900, "Surplus" and "Wastage" were entered, with other items, above the total line. Since the present form 900 was adopted, I have invariably followed the old practice in handling these items, so that the debit and credit totals would be in balance.

Respectfully,

Joe W. Milson

Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 20, 1917.

Mr. F. P. Benz,

Bureau of the Mint,

Washington, D. C.

Sir:

Pursuant to your request expressed when you were here, I am sending you the item of fine ounces on the bullion samples which you received from the Superintendent of Melting and Refining on July 2nd.

Mint Assay No.	Weight	Finenesses		Fine ounces	
		Gold	Silver	Gold	Silver
3773	.50	.808 $\frac{1}{2}$	.034	.404	.02
3779	.50	.779 $\frac{1}{2}$	.031	.390	.02
3800	1.59	.870	.121	1.363	.19
3848	1.67	.211	.225	.352	.38
3914	2.01	.861 $\frac{1}{2}$	.136 $\frac{1}{2}$	1.731	.27
3925	1.78	.860 $\frac{1}{2}$	.131	1.531	.23
Mass Melt #5	1.50	.727	.238	1.091	.36
" 6	.72	.425 $\frac{1}{2}$	.539	.306	.39
" 7	1.81	.361 $\frac{1}{2}$	.228 $\frac{1}{2}$	.654	.41
" 8	1.72	.857 $\frac{1}{2}$	.129 $\frac{1}{2}$	1.475	.22
Grains Bar #7	.94	.343 $\frac{1}{2}$	.443	.323	.42
Assayer's chip #1	1.95	.585	.316 $\frac{1}{2}$	1.141	.62
Total	16.69			10.781	3.53

Respectfully,

Farnum St John

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 10, 1917.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank forms:

	On hand	Wanted
Form No. 778, Settlement Bullion, . . . Dept.	50	1000
" " 829, Supt. M. & R.'s Daily Balance	350	300

Respectfully,

Joel W. Milson
Supt. M. & R. Dept.

Sample attached

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

October 11, 1917.

Sup. Thomas Arnear,
Superintendent, U. S. Mint,
Denver.

Sir:

On September 10th, last, I made requisition for 1000 blanks of Form 773, "Settlement Bullion, Dept," the same being properly ruled for the uses of this department. In response thereto, there have been delivered to me 1000 sheets of Form 899. This form has columns for gold and silver values, and the remaining space on the blank is so contracted as to make it difficult to enter all the necessary data relating to our settlement bullion. Besides this, the blank is unlined, it is on thinner paper, and is not adapted to the typewriter in use in this office.

I therefore respectfully request that the old form, No. 773, be furnished, as per the requisition of September 10th. A sample is attached hereto.

Respectfully,

Joe W. Milcom
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 31, 1917.

Hon. Thomas Annear,
Superintendent U. S. Mint,
Denver.

Sir:

Referring to the Director's letter of the 24th inst., and responding to the request contained therein, I herewith enclose the original form 773, as a sample covering my idea of what should be substituted for the present form 899, with the following observations regarding the same:

This department has for many years made its settlement statements in triplicate, the original for retention by the M. & R. department, one copy for the Settlement Commission, and one for the superintendent of the Mint. It is necessary that the original be cross-ruled and on heavy paper, because after settlement it becomes the working register of bullion for this department, and from it--and from no other source--all the anodes from said bullion are made up, and it must of necessity carry all notations concerning such work, and thin paper would hardly be suitable for such purposes. As to the value columns, they are entirely superfluous, as I have never known a value figure to be used; in fact, this department has no connection whatever with the matter of values, but only of ounces.

I sincerely hope that within the next three or four months we may be furnished with one thousand sheets according to the sample attached, one half of them cross-ruled on heavy paper, and the other half on thin paper with the cross-ruling omitted.

Respectfully,

Joseph Wilson Supt. M. & R. Dep.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

January 18, 1918.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Dear Sir:

Owing to the character of the bullion received by this Mint, 90.87 per cent of all anodes sent to the Refinery during the last fiscal year (1917), were silver anodes with a gold content of .3797.

Regular gold anodes comprised 6.92 per cent, with an average gold fineness of .8863.

The balance were gold chloride anodes, with an average gold fineness of .9384.

As to the latter, the quantity obtainable was not sufficient to make the necessary amount of chloride for the operation of the gold cell system; so we had frequently to use black gold from the silver cells for making gold chloride.

I present these facts concerning gold anodes, to show the absolute necessity for such a high percentage of our bullion being made into silver anodes. The amount of silver bullion received by this Mint is inadequate for the making up of the necessary amount of silver anodes to keep our present silver system of ten cells in operation; so we frequently are compelled to use mint fine silver for that purpose. To illustrate: During the last four months we used fine silver in the make-up of silver anodes as follows:

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Superintendent - 2

September, 1917		70,320.23	ozs.
October	"	62,280.70	"
November	"	90,540.78	"
December	"	<u>74,433.75</u>	"
Total		297,575.46	"

together with practically all silver bullion received, and that with only ten cells operating.

The doubling of our silver-cell capacity is now well under way, and when placed in operation it will be necessary to make up all anodes for the additional ten cells with mint fine silver -- approximately 140,000 ounces per month, and that will bring our consumption of mint fine silver in the making up of silver anodes to about 200,000 ounces monthly.

If it were possible to obtain in any way that amount of dore bullion each month, it would make that much additional fine silver available for coinage purposes.

Respectfully submitted,

Joseph Wilson

Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 22, 1918.

Hon. Thomas Annear,
Superintendent U. S. Mint,
Denver.

Sir:

Requisition is hereby made for the following blank forms, etc.:

	On hand	Wanted
Form 889 Supt. M. & R. Dept.'s Daily balance	225	500
" 929 Melts for Parting	500	1000
" 773* Settlement Bullion . . Dept.	25	1000
Self-Acting Binder to hold Form 963 (Deposits del'd to Supt.M.& R.) 6		

Respectfully,

Joe W. Wilson
Supt. M. & R. Dept.

Forms 889, 929, and 773 attached

* Copy of letter of Oct. 31, 1917, concerning Form 773, attached.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 7, 1918.

Hon. Thomas Annear,
Superintendent U. S. Mint,
Denver.

Sir:

Denver Mint Ingot Work

The first step in converting refined gold and silver into coin is to make an alloy with copper in such proportions as will produce "standard" blanks or planchets.

The standard fineness of gold and silver coin is the same, 0.900; yet the percentage of copper used in the make-up of gold and silver ingot melts is not quite the same on account of the segregation in silver-copper alloys. The silver ingot is the only ingot that is absolutely limited in width to the size necessary for the cutting of not more than two rows of blanks from each ingot or strip, and that limitation is fixed by the aforementioned segregation which causes the center of a silver ingot to be richer than the outside; so in making up our silver ingot melts we operate to a calculated fineness of 0.899 which will produce coin of standard fineness, 0.900.

Approximately one-third of the weight of silver ingots delivered to the coiner is returned as clippings (composed largely of the outer edges of the strips), and of a fineness of 0.898 or less, and as they must be remelted this further complicates the make-up proposition which can be adjusted only by varying the amount of copper according to the weight of clippings used in each bar melt. In gold ingots the calculated make-up is of the same fineness as is required for the coin.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - Ingot Work - 2

For nearly a year we have been using a circular furnace for all our melting, and with very satisfactory results. The fuel used is oil.

In gold and silver ingot work we pour the metal into the moulds at as low a temperature as possible -- just so it will conform to the moulds. We begin pouring at about the following temperatures: Gold at 1010 C., and Silver at 910 C.

Nickel ingots are composed of 75% copper and 25% nickel. Bronze ingots are composed of 95% copper and 5% of tin and zinc. The law does not specify the division of the 5% (tin and zinc); that is left to the judgment of the superintendent of the Melting and Refining Department; he may vary the amount of each to whatever extent is necessary to produce ductile ingots and good coin. Our practice in making that division is to use two parts of tin and three parts of zinc.

The average weight of the various ingot melts, the size and weight of the ingots, and the number per melt, are as follows:

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

S. ³¹ Superintendent - Ingot Work - 3

Kind of Melt	Weight	Size of Ingot	Ingot Weight	No. of Ingots
<u>Gold</u>				
Double Eagle	6175	$1/2"$ x $2-5/8"$ x $13\frac{1}{2}"$	147	42
Eagle	6175	$1/2"$ x $2-1/16"$ x $13\frac{1}{2}"$	118	52
Half Eagle	6175	$1/2"$ x $1-19/32"$ x $13\frac{1}{2}"$	89	69
Quarter Eagle	6175	$7/16"$ x $1-25/64"$ x $13\frac{1}{2}"$	70	88
<u>Silver</u>				
Half Dollar	4060	$1/2"$ x $2-5/16"$ x $13\frac{1}{2}"$	76	53
Quarter Dollar	4060	$1/2"$ x $1-7/8"$ x $13\frac{1}{2}"$	61	66
Dime	4060	$7/16"$ x $1-25/64"$ x $13\frac{1}{2}"$	40	100
<u>Nickel</u>				
	3400	$7/16"$ x $2-13/32"$ x $13\frac{1}{2}"$	60	56
<u>Bronze</u>				
	3600	$7/16"$ x $2-13/16"$ x $15"$	80	45

Respectfully submitted,

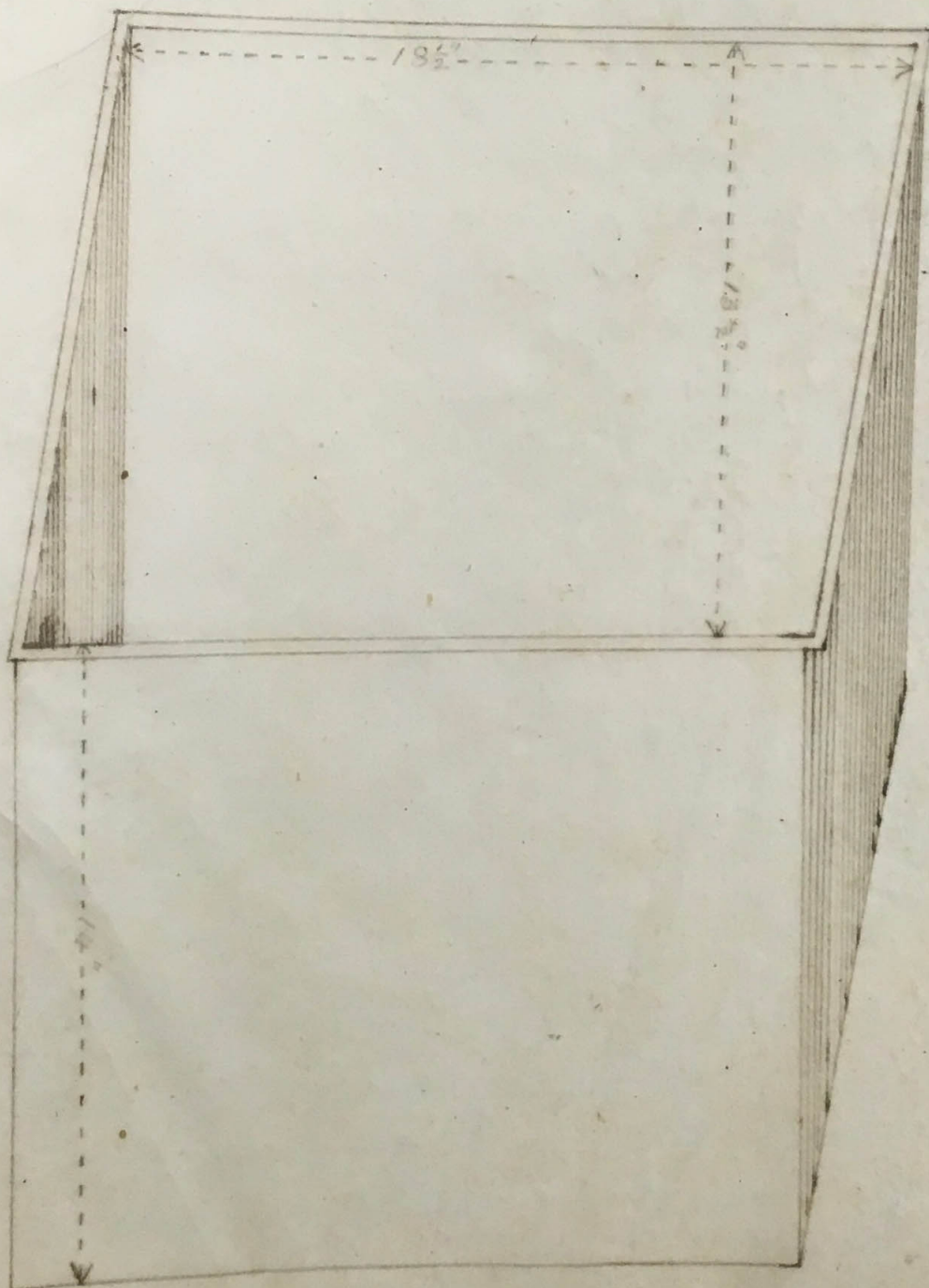
J. W. Milcom

Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINERS DEPARTMENT

Details of Porcelain Gold Cell.

All measurements are inside,
and inserted figures correct.



THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 25, 1918.

Hon. Thomas Annear,

Superintendent, U. S. Mint, Denver.

Sir:

Silver Anode Melt No. 602 of the current fiscal year, melted yesterday, contained three Seattle bars and eight silver bars. The Seattle bars were not melted in this mint until yesterday in said anode melt with the said silver bars, all of the latter having been previously melted in the Deposit melting room.

Floating on the top of said anode melt in the crucible we found something that would not melt; on examination we discovered it was iron or steel, consisting of what appeared to be a piece of a spring, 1-7/8 inches long, weighing .05 oz., and a large fish-hook weighing .25 oz; total weight, .30 oz. The Seattle bars were of the current fiscal year and the Seattle numbers are 258, 1815, and Mass 27. I submit the spring and fish-hook herewith.

Respectfully,

Joseph Wilson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 1, 1918.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In the present fiscal year, which is ended so far as Refinery operations are concerned, we made one hundred and twelve Silver Anode melts and forty-nine Gold Anode melts from Re-Deposit bullion received from the U. S. Assay Office at Seattle, Wash.

After crediting all recoveries from said anode melts, including pot-scrappings, etc., we made a net Gold gain on the Silver melts of 22.287 ozs., and suffered a loss of 50.513 ozs. on the Gold melts, making a total net loss on Seattle bullion treated during the year of 28.226 ounces of Gold.

Respectfully,

Jo. W. Milson
Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 1, 1918.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In the present fiscal year, which is ended so far as Refinery operations are concerned, we made eighty-one (81) Silver Anode melts, and twenty-seven (27) Gold Anode melts from Golden Cycle bullion.

After crediting all recoveries from said anode melts, including pot-scrappings, etc., we suffer a net Gold loss on the Silver Anode melts of 16.485 ozs., and on the Gold melts of 12.411 ozs., making a total net loss in Cycle bullion treated during the year of 28.896 ounces of Gold.

Respectfully,

John W. Wilson
Superintendent M. & R. Dept.

June 11th 1918.

Superintendent U. S. Mint,

Denver, Colo.

Sir: .

"Quantity of bullion operated upon" should include all original bullion actually placed in process for ingot or refinery work.

Bullion only vaulted should not be included.

Respectfully,

Joel Milson

Supt. M. & R. Dept.

M

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

July 10th 1918.

Supt. U. S. Mint,
Denver, Colorado.

Sir:

The final determination of the Settlement Commission discloses a gold wastage in the Melting & Refining Department of 195.449 ounces, and a silver surplus of 3900.89 ounces.

In the fiscal year 1918 we sent to the Refinery 76 gold and 615 silver anode melts, including in the latter 23 mass melts of 1409 bars, and the original melting operations, including recoveries, showed a gain on said melts of 201.697 ounces gold and 2530.22 ounces silver.

For settlement purposes we made three mass melts of 316 small bars, on which we lost 1.396 ounces gold and gained 100.07 ounces silver, thus making a net gain on anodes and mass melts of 200.401 ounces gold and 2630.39 ounces silver.

The Refining loss in gold was 198.697 ounces, which added to the aforesaid gain of 201.697 ounces, makes a total of 400.360 ounces of gold. The Refinery gain in silver was 93.38 ounces, which deducted from the aforesaid gain of 2530.22 ounces, leaves a balance of 2436.84 ounces, and all of said wastage occurred in operating upon other than original anode bullion.

Melts sent to the Refinery are melted FIRST into anodes; the gold product of the silver cells is, SECOND, melted into gold anodes and the silver product into fine bars; THIRD, the gold product of the gold cells is melted into fine bars; FOURTH, slimes and residue melting, including much sweating.

The amount of gold contained in original bullion sent to the Refinery in the fiscal year just ended was 1710,354.159 ounces, and the amount of silver 1837,874.16 ounces, making a total of 3,548,228.31 ounces of fine metal; yet the actual melting operations exceeded 10,000,000 ounces, and the aforesaid 400.360 ounces of gold and 2436.84 ounces of silver is the actual wastage on the additional (after the first) melting of approximately seven million ounces.

The most of the bullion received at this Mint contains a large percentage of base elements, principally tellurium, zinc, lead and nickel, as well as smaller percentages of antimony, arsenic, bismuth, etc.

The tellurium is the worst element we have to contend with as it volatilizes at a low temperature, and its fumes if permitted to escape carry off both gold and silver very rapidly.

We have exercised much care in our melting, at all times protecting the metal with a heavy covering of charcoal, but that some loss must occur is inevitable.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Page 2.

In the fiscal year 1917 we made a gain in anode melting of one-quarter ($\frac{1}{4}$) of an ounce of gold on each thousand ounces of fine gold contained therein, and in this fiscal year, 1918, we made a gain on each thousand ounces of twelve-hundredths (0.12) of an ounce - less than one-half the gain we made last year from the same source. If we had made the same gain in proportion to the amount operated upon this year, as we did last year, we would have returned a surplus of gold as well as silver at this settlement.

Against the Refinery wastage of silver, 2436.84 ounces, the Refinery is entitled to a credit of 795.89 ounces for silver contained in fine gold, leaving a balance as operating wastage of 1640.95 ounces.

The wastage in making silver ingots was 2985.06 ounces, and that amount with the surplus delivered to the Settlement Commission, 3900.89 ounces, making 6885.95 ounces, less the Refinery surplus, 93.38 ounces, and the gain on settlement mass melts, 100.07 ounces, leaves a total of 6692.50 ounces gain in silver in producing 8,065,653.40 ounces of ingots.

Respectfully,

Joseph W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 19, 1918.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Replying to your recent inquiries:

1. What amount of current is used in vertical system of silver cells? 400 to 450 amperes.
2. The size and number of anodes and cathodes per cell?
59 anodes, 16"x2³/₄"x3/8". 60 cathodes, 23¹/₂"x2³/₄".
3. What is the required length of time to run an average melt through the cells? Between five and six days.
4. The amount of free nitric acid and silver in the electrolyte?
1 to 2¹/₂ per cent. free acid and 3 per cent. silver.
5. How often is the foul electrolyte drawn from the cells? Controlled by the condition of the cells; usually a small amount each day.
6. What is the difference in time, if any, required to run a melt through the cells with the anodes sacked, over those unsacked? Sacked anodes require approximately one more day's time.
7. What is the average make-up of the silver anodes, in gold, silver, and base metal? Gold, .380 fine; silver, .525 fine; base, .095.
8. What is the average fineness of the black gold recovered from the silver cells? The average last month was .891 fine in gold.
9. What amount of gold, if any, remains in the fine silver product of the silver cells? From a trace to 3 ounces in 100,000.
10. Is both direct and alternating current used in the gold cells? Yes.

Respectfully submitted,

Jan. 2, 1919.

Superintendent U.S. Mint,
Denver, Colorado.

Sir:

The Bartley No. 80 special graphite crucibles that we are using at the present time are very unsatisfactory in this particularly, that they will not stand the heat of melting nickel.

Some of them show hair cracks on the outside six or eight inches long, but do not show corresponding cracks on the inside; however, if we fail to detect the hair cracks and put the crucible in the furnace we get a spill with its necessary delay and expense.

We have on hand quite a number of crucibles that were rejected without any use whatever on account of said cracks.

In one day last month we were running four furnaces in the ingot room and had three spills.

They stand up fairly well on silver and bronze, but will not do for nickel.

Respectfully,

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 22, 1919.

Superintendent, U. S. Mint,
Denver, Colo.

Sir:

The amount of copper used for alloy in making silver ingots
the first half of the current fiscal year, follows:

1918	Ounces	Pounds	Total
Sept.	18,438.60	1,127.08	
Oct.	45,284.70	3,105.23	
Nov.	41,051.25	2,814.94	
Dec.	3,044.65	208.78	7,256.03 lbs.

Respectfully,

Joseph W. M. & R. Dept
Supt., M. & R. Dept

GWW

February 7th, 1919.

Attendant, U. S. Mint,
Denver, Colorado.

In the fiscal year 1915, I began keeping an account of all recoveries of metal from gold and silver anode melting.

The gains during that and each succeeding fiscal year to date, and as well the amount of fine metal operated upon in each said years, and the gains, including the recoveries, per thousand ounces of fine metal operated upon in the Refinery, are set forth in the statement following, to wit:

Fiscal Year	Fine ounces Operated upon		Gains		Gain per 1000 ounces	
	Gold	Silver	Gold	Silver	Gold	Silver
1915	1,396,380.513	1,169,114.45	647.969	813.37	0.464	0.69
1916	1,669,214.490	1,729,420.01	524.200	3710.04	0.314	2.14
1917	1,303,439.174	1,498,147.06	328.172	2158.93	0.250	1.44
1918	1,710,354.159	1,837,874.16	201.697	2530.22	0.118	1.37

Respectfully submitted,

Joe W. Wilson
Supt. M. & R. Dept.

of the 20th inst. and as well the carrying of the same
 to the 20th inst. as the last three months of the year.

Amount	Fine Silver	Gold & Silver
100,000.00	100,000.00	100,000.00
100,000.00	100,000.00	100,000.00
100,000.00	100,000.00	100,000.00

Respectfully submitted,

James Wilson
 Agent, N. & E. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

June 17, 1919.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

In answer to your letter of June 16, 1919, in regard to possible sources of loss, I will say: There are four possible sources of loss:

1st. Refinery charged with more than it receives.

2nd. Loss by foul solutions to sewer.

3rd. Loss by volatilization in melting.

4th. Theft.

If the loss is not large, it may be attributed to any or all of the first three classes, and if evenly distributed through these sources, it would require a longer acquaintance with the operations here than I have had, to discover same.

Next year I intend putting in a settling tank in the gold room, and to bag the silver anodes, to eliminate as much as possible any probable loss in class 2. I should like, however, to be able some time to evaporate all foul solutions, thus eliminating all chance of this source of loss; also to introduce some system, as the Cottrell process, for recovering loss by volatilization.

We all know that there is an operating loss under the most favorable condition, which is generally covered by the anode gain; but if the plant is made to produce more than its capacity, the loss will be larger.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent 2

Realizing there is no specific information in the above statement, I respectfully submit same, hoping it may be of some use to you.

Respectfully,

B. W. Watson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 17, 1919.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

Answering yours of yesterday relating to probable wastage for the fiscal year 1919:

Of course, final determination has not yet been made; but present appearances are a bitter disappointment to me, as I had felt confident at all times throughout the year that the apparent gains on gold and silver anodes would not only take care of the wastage on other melting, but would also yield a surplus. I recognize three possible sources of loss in the Refinery operations:

- 1st. Up the flue.
- 2nd. Down the sewer.
- 3rd. Theft.

During the past year greater precautions have been exercised to prevent loss than ever before in the history of the Mint.

The fumes and gases from the furnaces that came out into the furnace room used to pass directly out of the building through vertical ceiling ducts. During the last year the tops of those ducts were closed and openings therefrom cut into an air duct through which the fumes travelled quite a distance, finally discharging into the fan chamber.

Formerly we treated our nitrate solutions by precipitating the silver as a chloride which was reduced by iron or zinc; in siphoning of the solution from the washed chlorides carelessness might send

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

values down the sewer. A year ago we changed the entire system of handling the nitrate solutions, towit: we have two large precipitation tanks, Nos. 1 and 2, into which we alternately sent the solution and after precipitating the silver with copper, and when the precipitation is complete which is determined by actual test in every instance, we draw off the solution into another tank, No. 3, where the copper is recovered by the use of iron--scrap tin; this solution in tank No. 3 after being thoroughly tested is discharged into the large alley tank, in which we throw down most of the copper and lead, the waste solution therefrom flowing into the sewer. Tank No. 3 is the final tank on the silver side, and tank No. 5 is the final tank on the gold side in the Refinery. During the past year the Assayer has made a great many tests on the solutions, particularly in Tanks 3 and 5, many of the samples being taken personally by the Assayer or his representative, and his findings do not disclose any condition to cause uneasiness.

Therefore I do not believe that either the first or second possible sources of loss hereinbefore referred to need to be seriously considered in looking for a large wastage. This leaves us the third source--theft. I have not at any time during the year had any intimation of any suspicious happenings in or about the Refinery that indicated crookedness on the part of any of the employees; and until the last ten days I had not given a serious thought to the matter of theft. However, during the year we lost three of our oldest and most trusted employees by death from the "flu," and in addition a large number were sick, so that it necessitated the employment of many new

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 5

men in the Refinery operations. Some worked a few days, and some are still on the Refinery roll. The names of men employed in the Refinery who had never worked there prior to this year are as follows:

Baskind, Bowers, Conlon, Chapman, Donahue, Halden, Halstead, McClung, Mero, O'Connell, Pierce, J.F.Welsh, W.R.Welsh, Wileox, and Whitely.

The amount of bullion in our vaults and delivered to the Commission at last settlement, was, fine ounces:

Gold, 1,240,220.985

Silver, 2,176,823.34

As soon as we have determined the amount on hand, I shall be pleased to present the figures to you.

Respectfully,

Joachim

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 28, 1919.

Hon. Thomas Annear,
Superintendent, U. S. Mint
Denver.

Sir:

In view of the very unsatisfactory conditions in the Refinery, I think it would be wise to make some changes when we start the Refinery.

I would recommend therefore putting either Mr. Spencer or Mr. Stoddard in charge of the melting room; Mr. Borstadt in charge of gold cells, and Mr. Pierce in charge of silver cells.

I also feel that these positions should be paid more than they are at present, and would also like to see Mr. Ryan receive an increase.

Trusting this will meet with your own judgment, I submit the above for your approval.

Respectfully,

B. W. Watson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 30, 1919.

Statement of Minor Coinage Metals Account.

	Troy ozs,
Balance on hand, as per Bookkeeper.	1,301,224.38
Actual balance on hand	<u>1,284,716.21</u>

Wastage, Nickel	2,614.60	
Bronze	<u>13,893.57</u>	<u>16,508.17</u>

Respectfully,

J. H. Hetrick

Acting Supt. M. & R. Dept.

July 2, 1919.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

September 19, 1919.

Hon. Thomas Annear, Superintendent,

U. S. Mint, Denver.

Sir:

Replying to your letter of the 18th inst., I beg to submit the following data regarding Silver Anode Melts, Nos. 25 and 26:

No. 25, delivered to Refinery Sept. 9, 1919:

	Weight	Fineness		Fine ounces	
		G.	S.	G.	S.
Ref'y Gold Set. #2 - 7 bars	2779.53	.7454	.208	2071.831	578.14
1920 Dep. #205, Bar 3	1134.77	.00025	.9135	.291	1064.01
" " " " 6	1129.68	.00025	.9135	.282	1031.96
" " 353 " 1	419.00	.005	.8925	2.095	373.95
Total	5492.98			2074.529	3048.06

Average fineness as made up .3776 .5549

Weight after first melting, Sept. 9, by Bush, 5488.90

" " second " " 11, " Dardia, 5485.90

Remelted because A and B samples did not check.

Fineness reported by Assayer Sept. 12, on samples from second melting:

Gold, .4069; Silver, .5315

Fine ozs. in melt, based on Assayer's report (wt. after second melting):

2232.212 2915.75

Apparent gain, Gold

* 157.683

" loss, Silver

* 132.31

1920 Deposits, Mexican silver

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

No. 26, delivered to Refinery Sept. 9, 1919:

Ref'y Gold Set. #2 - 7 bars	2780.63	.7454	.208	2072.681	578.37
1920 Dep. #205, Bar 2	868.77	.00025	.9135	.217	793.62
" " 206, " 2	938.12	.00025	.9775	.247	965.89
" " 230, " 2	<u>781.45</u>	.00075	.806	<u>.586</u>	<u>629.84</u>
Total	5418.97			2073.731	2967.71

Average fineness as made up .3826 .5478

Weight after first melting, Sept. 9, by Bush, 5413.00

" " second " " 11, " Dardis, 5409.70

Remelted because A and B samples did not check.

Fineness reported by Assayer Sept. 12, on samples from second melting:

Gold, .412; Silver, .527

Fine ozs. in melt, based on Assayer's report (wt. after second melting

2228.796 2850.91

Apparent gain, Gold

* 155.065

" loss, Silver

* 116.80

1920 Deposits, Mexican silver.

* A slight addition will be made to these figures by the recovery from melting determined at end of month.

I see no other way to handle this matter than to keep a memorandum record of these apparent gains and losses, and at the end of the fiscal year they will be verified or not as the case may be, and the proper steps then taken to correct same.

Respectfully,

R. M. Nelson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

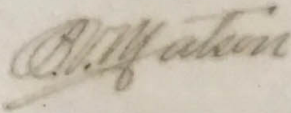
September 23, 1919.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

In answer to your letter of even date, I find the Ingot room has been credited with 100 ounces Silver recovered from Sweeps cellar for the year ending June 30th, 1919, but I can find no record in my department of the amount of fine ounces gold and silver recovered as metal from Sweeps cellar operations.

Respectfully,



Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 24, 1919.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

Following out our conversation of last Spring, I should like to recommend increase in wages of the men in charge of the gold room, silver room, and melting room, Refinery, as follows, to wit: Mr. Sprietadt, Mr. Peirce, and Mr. Stoddard be increased from \$4.50 to \$5.00 per diem, to take effect the 1st of October, if possible. Trusting this will meet with your approval, I remain,

Respectfully,

Wyatt

Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER.
MELTER AND REFINER'S DEPARTMENT.

September 26, 1919.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

I reply to your letter of September 22d, I should like to know if an approximation of the make-up assay, say, within one or two points, would not be what Mr. Wheeler desires, rather than a bar statement.

Respectfully,

Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 26, 1919.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

With reference to the letter of the Director of the 23d inst., calling for a correction of the accounts of the July-September quarter made necessary by the assumed switching of assays, I submit the following data, as per his instructions, regarding Refinery Gold Settlement Melt No. 2. As its name implies, Refinery Experimental No. 691 was merely an experimental assay, no metal going into settlement under that assay:

Refinery Gold Settlement Melt No. 2:

Original Weight	Original (switched) Assay Results		Assay Results		Corrected Assay Results			
	Fineness		Fine ozs.		Fineness		Fine ozs.	
	Gold	Sil.	Gold	Silver	Gold	Sil.	Gold	Silver
5560.23	.7454	.206	4144.595	1156.53	.802	.172	4459.304	956.35
							4144.595	1156.53
Increase, Gold							314.709	
Decrease, Silver								200.18

Respectfully,

B. M. Smith

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

September 29, 1919.

Mr. George A. Nichols,
Deadwood, South Dakota.

Dear Sir:

Would you consider a position in the Refinery of this Mint at \$4.50 per day, which does not include the congressional bonus of \$20 per month? I should like very much to have you consider this favorably. I am thinking there will be an opening soon; so please answer at once.

Respectfully,

W. H. Hanson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT

September 30, 1919.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

The Assayer's request for bar make-up seems rather unusual. I should like to know just how and why it is necessary; in other words, just what is the information he desires, and how does it apply?

Respectfully,

B. J. H. H. H.

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 16, 1919.

Hon. Thomas Anxear, Superintendent,
U. S. Mint, Denver.

Sir:

Requisition is hereby made for the following blank books:

Form No.	On Hand	Wanted	Description
184	1	6	Record of Silver Ingot Melting
871	1	6	Refinery Gold Account

Samples attached

Respectfully,

B. W. Johnson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 24, 1919.

Hon. Thomas Annear, Superintendent,

U. S. Mint, Denver.

Sir:

Silver Anodes Nos. 92 and 93 were delivered to the Refinery on October 17th, the make-up being as follows:

	Weight	Fineness		Fine ounces	
No. 92	5295.40	.3908	.5206	G. 2016.484	S. 2756.78
93	5298.70	.3794	.5246	2010.511	2779.53

After melting the finenesses as reported to this office by the Assayer were, No. 92, Gold, .381; Silver, .486; No. 93, Gold, .3794; Silver, .489. This discloses a gain of Gold in the two melts of 0.378 ozs., which is practically a stand-off on that metal, as no deduction of weight on account of loss in melting has been made in the above calculations.

But the loss in Silver on these two melts is abnormal, being as follows:

Melt No. 92	183.22	
93	188.47	Total loss, 371.69

Respectfully submitted,

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT.

November 12, 1919.

Hon. Thomas A. Annear, Superintendent,

U. S. Mint, Denver.

Sir:

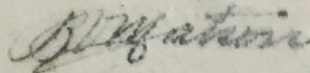
Complying with your request to make a report on anything unusual occurring in the M. & R. Department, I present the following:

Gold Anode Melt No. 10, weighing 5,978.35 ozs., make-up gold fineness, ⁹²⁹³.9293, was reported by the Assayer after melting at a gold fineness of ⁹³³⁸.9338, showing an apparent gain of 27.752 ozs. of gold.

Gold Anode Melt No. 11, weighing 5,973.87 ozs., make-up gold fineness, .9337, was reported by the Assayer after melting at a gold fineness of .9297, showing an apparent loss of 23.682 ozs. of gold.

The result shows a reasonable gain on the two melts, but the reported finenesses indicate quite clearly that there was a switch somewhere of the samples, and as both were melted in the same furnace the granulations from the first would be disposed of before the second would be melted; and so it does not appear probable that the switch was made in the Refinery.

Respectfully,



Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 2, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In regard to Mr. Fitzsimmons' request for information relative to equipment for the installation of an electrolytic refinery to handle \$2,000,000 worth of gold, I offer the following:

First, a few general remarks in extenuation of any faulty reasoning contained in same on account of lack of information to wit: In his letter he does not say what grade of bullion he has to work on, or if he wants to prolong the refining operation through the best part of the year, etc., nor does he say what their source of electric power is. The first consideration, i.e., the grade of bullion, is very important, in this way--whether provision has to be made to put all the bullion through the silver cells, or in what proportion to so do. I have assumed in compiling the following equipment that the major portion will have to go through the silver cells, also that the operations will extend through about ten months; in other words, the equipment will turn out a minimum of 10,000 ounces of gold per month, under the assumed conditions, but may be made to more than double that amount, if the major portion of the bullion can be put directly through the gold cells. The distance from source of supplies has been given due consideration in that an extra supply of material is included. So the list does not represent the minimum amount he can get by with, but represents the approximate cost at factory or at Denver.

Superintendent - 2

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

12 gold cells, vitreosil

\$312 (less 1r duty removed)

5 to 6 of these cells are to be used as gold cells, the rest as containers, reserve, etc.

Herold China & Pottery Co., of Golden, Colo., are making a porcelain cell for us, to cost about \$68, but we have not received any; so cannot recommend them at this time.

20 porous cells, large size

120

To make gold chloride by current

20 porous cells, small size

80

To make gold chloride by current

4 white enamel tanks, about 18x24x44

240

2 to be used as silver cells; the rest for containers, etc.

6 large white enamel tanks, 24x24x48

390

To be used for foul solutions, precipitating tanks, etc.

6 stoneware tanks, 18x24x44, or smaller

300

To be used as filters and containers

12 porcelain pithers, 1 gallon, common hotel ware

48

12 " plates, 10" diam. " " "

6

6 trucks, about 24x44 inches, roller bearing

250

4 stoneware flat cells & baskets 11x19x39

288

6 " crocks, 20" diam. 20" deep

200

To make silver nitrate or gold chloride by aqua regia

1 set of rolls, 5"x8"

2000

50 rubber-covered steel rods

50

Forward

\$4284

THE MINT OF THE UNITED STATES AT DENVER,

Superintendent - 3

MELTER AND REFINER'S DEPARTMENT,

Forward

\$4284

4 hard rubber pumps for silver cells	25	
12 " " " " gold "	40	
1 set silver anode molds	90 (finished)	
1 " gold " "	80	"
1 " fine gold "	80	"
1 " " silver "	80	"
2 sheets asbestos mill board	6	
1 bolt asbestos cloth	40	
50 ft. 1 inch steam hose	40	
2 motor generator sets	2280 (Wt. 2500 lbs)	

One set may furnish current enough to run the plant, depending on how it is connected up, grade of bullion, etc.; but it is well to have a set in reserve.

1 switchboard for same	1400	"	3600	"
1 alternating current set, or A.C. regulator	2000	"	1800	"
1 small fan to supply air to refinery	150			
Extras for glass rods, tools, etc.	<u>100</u>			

\$10,695

Total

I have left out the cost of acid proof floors, furnace, etc., also supplies for operation. Realizing the amount of time necessary to obtain more definite information, and knowing it may be open to criticism on account of lack of same, I submit the foregoing list for your approval, hoping it may be of some assistance to Mr. Fitzsimmons.

Respectfully,

B. M. Watson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 7, 1920.

Hon. Thomas Annear,

Superintendent, U. S. Mint, Denver.

Sir:

There seems to be a difference of opinion as to how your request for overtime work in the ingot room should be complied with. For that reason and also because this office is very busy, it may be better if you could get this information from the time-keeper. But if you wish us to furnish it we will do the best we can to supply the desired information. So, in order to carry out your request, I respectfully ask specific information on the following points:

1. Is the full time of temporary employees to be taken as overtime?
2. In the case of regular employees from other departments, say, the Refinery, working in the ingot or make-up rooms, is their full time in those rooms to be taken as overtime?

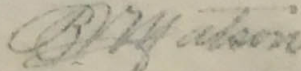
Note: The time lost from the Refinery by a Refinery man working in the ingot room has to be made up later on by overtime in the Refinery; so that it would seem only just to charge his full time on this coinage work to the coinage overtime.

3. Is the monthly bonus to be taken into account in this statement? If so, must it be pro-rated among the departments in which a man works during the month?

4. Should the figures furnished correspond with the pay-roll?

Note: The time sheet kept in this department is according to the calendar month, while the pay-roll is often dated back two or three days each month.

Respectfully,



Supt. M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 26, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver, Colo.

Sir:

It looks as though we will have a loss of 242.163 ozs. of gold and a gain of 966.28 ozs. of silver. These figures are arrived at in the following manner:

It takes two-tenths of an ounce gain on every thousand ounces of fine gold charged, and four-tenths of an ounce gain on every thousand ounces of fine silver charged, to cover operations of refinery.

2/10 on gold operated on,	128.383
From monthly reports, anode gold loss	36.390
* Loss on Cu and base Ag settlement bullion sent to refinery	<u>77.390</u>
Total Gold Loss	242.163
4/10 on silver operated on	256.76
* Loss on Cu and base Ag settlement bullion sent to refinery	<u>194.74</u>
	451.50
Gain on silver operated on	1,417.78
	<u>451.50</u>
Total Silver Gain	966.28

These figures may be increased or decreased as the case may be from anodes out of settlement on which I have no check.

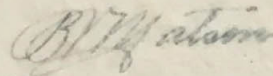
* Cu's, 1 to 12, inc.
Ag's, 44, 47 to 50, inc., 52, 55, 57 to 60, inc.
all 1919 settlement bullion.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

This department is entitled also to a direct credit of 377.99 ounces of fine silver on account of Silver Settlement Melt No. 34, which was reported at 644½ fine, but which was in fact only 544½ fine. This error was reported November 6, 1919, on the October anode sheet and by letter of October 24, 1919.

Respectfully,



Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 28, 1920.

To Whom It May Concern:

This is to certify that Louis Gex has worked
in the Ingot Melting room of the Denver Mint from November 20, 1919,
to February 28, 1920, and has been found to be capable, willing, and
efficient in all work assigned to him.

Respectfully,

[Signature]
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 10, 1920.

Mr. F. K. Van Court,
C/o U. S. Assay Office,
New York.

Dear Sir:

Owing to the press of business incident to the settlement,
your recent letter regarding Mr. Wirth has been neglected by me.
As you doubtless know, he is in a hospital in this city suffering
from an attack of appendicitis, but at last reports was doing nicely
and expected to be out soon, without an operation. Otherwise,
things are coming along nicely here.

Yours very truly,

W. J. Wirth

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

March 15, 1920.

Settlement Commission of March 8, 1920.

Sirs:

In compliance with your request I submit the following explanation for a surplus in settlement of 140.654 fine ounces of Gold and 30.64 fine ounces of Silver:

In September I had three spills owing to belt breaking on blower, causing "freezing." This material recoverable only as a return from sweeps cellar operations together with recoveries from flues and settling chambers from elimination of 997.6 ounces of base carrying with it a certain amount of gold and silver, account for the gains made, and do not appear on the anode sheets.

I was getting ready to operate on the by-products of platinum, etc., having concentrated the platinum metals in three gold anode melts, which went into settlement as Nos. 80, 81, and 94, with more to follow, when the Director's orders to make a settlement came, and of course stopped all work in this direction.

By request of the Superintendent, Mr. Annear, on February 25th. I gave him figures taken from my anode sheets and figuring on two-tenths assay gains on gold and four-tenths assay gains on silver, which of course are debatable figures, subject to a difference of opinion. These sheets indicated at that time a probable loss in gold and a gain in silver, but were incomplete as figures on sweeps cellar and flue clean-up operations were not yet available. These operations apparently made up for the indicated loss and gave a surplus on gold, but de-

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

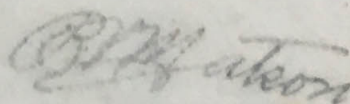
Settlement Commission - 2

creased the indicated gain on silver, as explained before.

I wish to call your attention to the fact that I have changed slightly the manner in which the figures on these anode sheets are obtained, i. e., I have insisted on weighing up clean anodes, all skimmings, dirt, slag, small pieces of metal, etc., from each cleaned melt being kept till the end of the month, and put into clean-up bar, and accounted for as usual. This was done to get away from the great discrepancy shown in the past between the great indicated gains and the actual facts on settlement.

Trusting this will meet with your approval, I remain,

Respectfully,



Superintendent Melting & Refining Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 17, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The following is a brief outline of repairs necessary in the Refinery for the coming year:

4 or 6 large wooden tanks; 2 or 3 of these to be used for precipitating silver, and 2 of them for precipitating copper; all to operate on silver foul electrolyte.

New cement floor in melting room.

Lead bench for gold cells and part of walls to be covered with muslin.

Lead pipe over silver nitrate hoods should be strengthened.

Sweep cellar installations complete the imperative requirements.

New copper cell installation requiring steam coils to replace the old should be done, but can wait until later.

Respectfully,

B. J. Watson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 17, 1920.

Hon. Thomas Annear,
Superintendent U. S. Mint,
Denver.

Sir:

The following is a brief outline of repairs necessary in the Refinery and Sweeps Cellar for the coming year:

- a. 4 or 5 large wooden tanks; 2 or 3 of these to be used for precipitating silver; and 2 of them for precipitating copper; all to operate on silver foul electrolyte.
- b. New cement floor in melting room.
- c. New blower for Refinery melting room installed.
- d. New decking on bridge from elevator, to be made wider also if possible.
- e. Two small trucks to be repaired.
- f. Lead bench for gold cells and part of wall to be covered with muslin.
- g. Lead pipe over silver nitrate hoods to be strengthened.
- h. Sweep Cellar installations complete the imperative requirements.

New copper cell installation requiring steam coil to replace the old; also to move hydraulic press to make room for rag furnace, should be done, but can wait until later.

Respectfully,

R. Watson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 22, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Following is the list of new equipment as requested:

- 8 acid-proof stoneware tanks, about 38"x22"x20" depth, outside dimensions; (1 inch less on any dimension does not matter) with outlet 1-3/8" in diam. to be 1/2" from bottom of outlet to bottom of inside of tank, and to be placed at center of end; tanks to have rounded corners or round ends as in M. A. Knight's catalog, so as to stand expansion under load, due to hot water washing.
- 6 acid-proof flat-bottom stoneware crocks, about 19 1/2" diam. to 20 1/2" deep.
- 3 round-end acid-proof tanks, 18"x26"x20 1/2" deep, outside dimensions; outlet to be 2" in diam. on outside, tapering to 1-5/8" on inside, and placed in center of side, 1/2" from bottom of tank to bottom of outlet.
- 6 acid-proof stoneware standard tanks, about 26"x50"x24 1/2" deep, outside dimensions; to stand temperature of 40 to 50 deg. Centigrade, derived from resting on steam coils.
- 6 acid-proof stoneware jars, about 19" diam. and 15" deep, outside dimensions, flat-bottom.
- 2 hydrometers, for acid and heavy liquids, Beaume, 0 to 70, as in Denver Fire Clay catalog, No. 4850
- 12 flasks, Erlenmeyers, capacity 250 cc., as No. 4314 in Denver Fire Clay catalog.
- 6 dropping bottles, Schuster's, with stopper, and capacity of 60 cc., as No. 2928, Denver Fire Clay catalog.

Respectfully,

A. J. Watson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 24, 1920.

RECEIVED of Thomas Annear, Superintendent of the Mint of the United States at Denver, eighty-eight (88) pieces condemned half dollars, and two half-dollar blanks; total weight, thirty-five and 95/100 Troy ounces, (35.95), the same being deficit of April 23, 1917.

B. M. & R. Dept.
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 26, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Replying to your letter of this date, concerning the Ingot Melt of February 21, 1919, No. 576, I respectfully submit the following data:

The melt was made up by Mr. St. John (Mr. Hetrich the make-up clerk being absent sick) and consisted of the following items:

1 Mint silver bar, Melt No. 198 at .999 $\frac{1}{2}$	885.80 ozs.
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1 " " " " " 205 at .999 $\frac{1}{2}$	<u>783.80</u> "
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Total at .999 $\frac{1}{2}$	1669.60 "
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Mexican Coin, Pesos (part of Deposit No.

2159) at .901 $\frac{1}{2}$	1201.40 "
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Ditto, 50 Centavos (part of Deposit No.

2158) at .800	1072.50 "
---------------	-----------

Calculating the melt to .899, as is our custom on Silver ingot make-up, the fine silver bars required 186.65 ozs. copper. The Pesos required 3.35 ozs. copper.

Total copper required	190.00 ozs.
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The Centavos contained an excess of copper	<u>118.10</u> "
--	-----------------

Net copper required and used for entire melt	71.90 "
--	---------

The melt was stirred and poured by Mr. Borstadt into 66 Quarter dollar ingots, weighing 4039.40 ozs.

The Assayer reported the melt at .905 $\frac{1}{2}$.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

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Subsequently the melt was clip-sampled and the samples were reported at .9007.

On February 27th, the melt weighing 4038.15 ozs. (to which 7.65 ozs. of copper was added on assay of .9007 as by clip as above) was remelted by Mr. Borstadt, and poured into ⁵⁴Half Dollar ingots (the change to Half Dollar ingots having taken place on February 24th).

The Assayer reported the remelt at .898 and condemned it.

On March 3d, the 54 Half Dollar ingots were added to the make-up work as clippings, and entered into the melts of that day as so much standard metal, the melts for that day being Nos. 623 to 631, inclusive, all of which were passed by the Assayer for delivery.

Respectfully,

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT.

March 30, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to your letter of the 29th inst., I respectfully submit the following information about the method employed in the make-up, melting, etc., of Silver Ingots:

The fine silver bars--Purchase silver or Mint fine--are first each weighed separately and given the ingot melt number by painting said number on each bar. If more than one bar to the melt, then each bar is so numbered. In the case of Mexican coin bars, such bars are marked with the same melt number as the fine bars to which said Mexican bars belong. In the case of unmelted Mexican coin, the box containing same is marked with the number of the melt to which said coin belongs.

The copper alloy for the fine bar or bars is calculated and checked by a second person. In the case of melts into which Mexican coin bars or unmelted Mexican coin enter, the excess copper, if any, in said bars or coin is calculated in the same manner and deducted from the copper required to alloy the fine bars. In the case of Mexican pesos or bars made therefrom, there may be a further addition of copper to the alloy required for the fine bars contained in the same melt.

All silver ingot melts are made to a fineness of .899. The required amount of copper is then weighed and placed in a suitable box

THE MINT OF THE UNITED STATES AT DENVER,

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which has the melt number marked upon it in chalk. The melt tag (samples enclosed) giving the melt number, weight of fine metal, or fine metal and Mexican coin bars or coin, if any, the weight of the copper alloy, and the total weight of the melt as made up, noting the drop of alloy for clippings correction, if any, is placed in the box with the alloy.

In the morning, each melt--fine metal, and other bars, and alloy--is placed on the scale and the weight checked before being sent to the melting room.

In practice, the melts are composed of one-half or more of clippings. On account of the well-known deficiency in fineness of clippings, $1\frac{1}{2}$ to 2 ounces of the copper alloy, as calculated, is dropped, and the corrected weight of the alloy and bars is checked before going to the melting room as above.

Each box and the bars are placed high number down, the last melt for the day being on the bottom. The number of each melt that each melter has is marked with chalk on his furnace, to correspond with the way they are placed. When a melt is poured, the man who pickles the ingots numbers the melt with blue chalk to correspond with the number on the melter's furnace. Only one melt is pickled at a time, and only one melt is put on truck (truck is too small to hold more than one melt). The ingots are then topped, filed, and stamped. The man who poured the melt does the final stamping with steel stamps. He has the number on his furnace, the number that the pickler put on, and also the number on the blackboard to check with. The blackboard has the date, melter's name, and the numbers of his melts for the day.

THE MINT OF THE UNITED STATES AT DENVER,

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After putting the final stamp on his melt, the melter draws a line through that number on the blackboard. The melt is then placed by itself on a truck to go back to the make-up room.

The assays or granulation samples are taken by the melter. He takes one sample (A) on first mould, one at center of melt (B), and one on the last mould (C). Only one melt is sampled at a time. The cups for samples are placed by the furnace by the man who attends to the samples and who dries them and puts them in envelopes and weighs them with the Assayer. The envelopes are numbered in the morning, ^{for that day's work} and placed in the sample-box, each melter's numbers being separate and in rotation.

Each melt is stirred 75 times or more.

At the end of the day, the sweepings of bench and floor are put into the last crucible, after the melter has poured his last melt. This material is poured into a shoe-mould, and is weighed back with the tops and goes into the next day's melts.

The results as to fineness have always been very satisfactory, the assays running .8988 (rarely .8986 which is the limit for low at which the Assayer will pass a melt) to .900 or a little over, mostly about .899 to .8996 for high.

The various melts of the day, 4000 to 4300 ozs. each, together with the residue, are weighed, and the difference between such amount and total charged to the room in the morning shows each day's apparent loss.

The ingots are held until the Assayer reports upon them as being of proper fineness for delivery to the Superintendent, or otherwise, when the proper melts are again weighed on the transfer scales and de-

THE MINT OF THE UNITED STATES AT DENVER,

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livered to the Coiner through the Superintendent.

Condemned silver ingot melts have been very few since the beginning of operations.

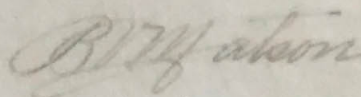
On March 9, 1918, nine melts (Nos. 1270 to 1278, inc.) were condemned: four at .8982; four at .8981; one at .898. These melts were returned and used to fill melts on March 16, 1918. The ingots of that day passed at .8989 to .8991.

There have been a limited number of melts slightly below the passing point which have been used in a similar manner.

For history of Melt No. 576 (February 21, 1919) which was condemned for being high, please refer to my letter to you of March 26, 1920.

Samples of melt tags enclosed.

Respectfully,



Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

March 31, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In reply to your letter of March 30, 1920, in regard to Bureau report of high coin in deliveries Nos. 8, 10, 12, 14, 16, and 22, I wish to report that I have investigated the circumstances thoroughly and find that the ingots from which these deliveries of coin were made were melted last year before I took charge of this department. Therefore I have no knowledge of same other than what the records show and what I can get from the men who were here at the time.

There is a circumstance which may have a bearing on the matter, to-wit: On February 21, 1919, Melt No. 576 was reported at .905 $\frac{1}{2}$ and condemned by the Assayer. The remaining five melts of the same day are as follows: No. 573, .8988; No. 574, .8988; No. 575, .8988; No. 577, .8988; No. 578, .8986. All the melts of this day were made into Quarter dollar ingots.

These melts were made up of mint fine silver bars and unmelted Mexican coin. Subsequently melt No. 576 was clip-sampled and the sample was reported at .9007. On February 27th, the melt was remelted after adding 7.65 ozs. copper on assay of .9007, instead of .905 $\frac{1}{2}$, and poured into Half Dollar ingots. The Assayer reported the remelt at .898 and condemned it. On March 3d, the ingots were added to the make-up work as clippings, and entered into the melts of that day as so much standard metal, the melts of that day being Nos. 623 to 631, inclusive, all of

THE MINT OF THE UNITED STATES AT DENVER,
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which were passed by the Assayer for delivery.

The 7.65 ozs. copper added to the remelt of the melt numbered 576, if applied to any of the other five melts of February 21st, would produce a fineness in No. 573 of .897; in No. 574 of .8971; in No. 575 of .8971; in No. 577 of .8969; and in No. 578 of .8969.

The same amount of copper, 7.65 ozs., applied to No. 576, at .905 $\frac{1}{2}$, the original report on the regular granulation sample, would give a result of .9037. The 7.65 ozs. copper added to the remelt of ingots marked 576 at the fineness of .9007, as given on assay of chip samples, would give a fineness of .899. The assay on same was .898.

In view of subsequent events, it would appear as though this high melt by some error got through to the Coiner, either by switching the samples or reports of same in the Assay department, or by misnumbering the melt. This would be a possible explanation for high coin, but if there are low coin also in any of these deliveries, the explanation for both high and low would be solely up to the Assayer.

Mr. Hetrich who has charge of the make-up room, and who has probably had as much experience along this line as anyone in the Mint service, concurs with me in these probabilities.

I have investigated the contingency of misnumbering and find that it is very improbable as there are three different checks on the numbering before melts leave the melting room. The men working there and in the make-up room were all old, experienced, reliable men. (See my letters to you of March 26th and March 30th, 1920).

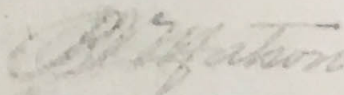
If these melts of February 21st had all been held until a satisfactory explanation of the erratic behaviour of melt No. 576 was found

THE MINT OF THE UNITED STATES AT DENVER,
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the Melting and Refining department would have been blameless for any subsequent discrepancies in the coin, and the future the above rule will be adhered to.

Respectfully,



Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 31, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In compliance with your request, I submit the following assays reported to this office by the Assayer on Quarter Dollar ingot melts going into deliveries Nos. 8, 10, 12, 14, 16, and 22, as reported by the Coiner:

Assay	Melt No.	Delivered to Coiner
.8988	574	February 25, 1919
.8989	523	" 10, "
.8986	578	" 25, "
.8988	573	" 25 "
.8986	577	" 25 "
.8986	552	" 19 "
.8988	575	" 25 "
.8993	538	" 17 "
.8989	541	" 17 "
.8991	539	" 17 "
.8986	551	" 19 "
.8987	540	" 17 "
.8989	542	" 17 "
.8986	554	" 19 "
.8988	537	" 17 "
.899	560	" 20 "
.8991	559	" 20 "
.8993	556	" 20 "
.8987	546	" 18 "
.899	501	" 3 "
.8991	479	January 24 "
.8993	555	February 20 "
.8992	558	" 20 "
.899	509	" 5 "
.8992	504	" 4 "
.8986	512	" 5 "
.8987	510	" 5 "
.8989	506	" 4 "
.8987	511	" 5 "
.899	508	" 5 "
.8988	543	" 18 "
.8987	545	" 18 "

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Assay	Melt No.	Delivered to Coiner
.899	507	February 5, 1919
.899	568	" 24 "
.8991	567	" 24 "
.8988	547	" 18 "
.8988	367	December 9, 1918
.899	383	" 16 "
.899	373	" 12 "
.8989	569	February 24, 1919
.8989	381	December 16, 1918
.8989	571	February 24, 1919
.899	570	" 24 "
.899	384	December 16, 1918
.8988	572	February 24, 1919
.8988	368	December 9, 1918
.8991	366	" 9 "
.8987	369	" 9 "
.8989	370	" 9 "

Also assays on Quarter Dollar ingot melts in process of coining:

.8988	553	February 19, 1919
.8991	385	December 20, 1918
.8992	404	" 28 "
.899	505	February 4, 1919
.899	405	December 30, 1918
.8989	376	" 14 "
.8989	464	January 21, 1919
.8992	402	December 28, 1918
.899	386	" 20 "
.899	410	" 30 "
.8991	410	February 19, 1919
.8988	549	December 28, 1918
.8993	403	January 21, 1919
.8989	466	" 21 "
.8989	467	December 20, 1918
.899	387	" 30 "
.8991	409	

The foregoing melts in process are the ones from which the Assayer took 100 sample blanks on March 26, 1920.

Respectfully,

B. Watson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

March 31, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

In answer to your letter of this date regarding Silver ingot melts of February 21, 1919, Nos. 573, 574, 575, 576, 577, and 578, I submit the following data:

The melts for the day were made up by Mr. St. John (Mr. Hettrich the make-up clerk being absent sick) as follows:

No. 573

2 Mint silver bars, Melt No. 197, at .999 $\frac{1}{2}$	1822.10 ozs.
Mexican coin, Pesos (part of Deposit No. 2159), at .901 $\frac{1}{2}$	800.80 "
Ditto, 50-Centavos (Dep. No. 2163) at .800	1596.56 "
Copper required to alloy fine bars	203.70 "
" " " " Pesos	1.37 "
Total copper required	805.37 "
Excess copper in 50-Centavos	176.02 "
Net copper required and used for entire melt	29.35 "
Melted by Mr. Spencer; 66 Quarter Dollar ingots, Assayer reported melt at .8988.	4035.55 "
Delivered to Coiner, Feb. 25, 1919.	

No. 574

2 Mint silver bars, Melt No. 197, at .999 $\frac{1}{2}$	1844.10 ozs.
Mexican coin, Pesos (part of Deposit No. 2159), at .901 $\frac{1}{2}$	800.66 "
Ditto, 50-Centavos (part of Deposit No. 2158), at .800	1584.50 "
Copper required to alloy fine bars	206.15 "
" " " " Pesos	1.37 "
Total copper required	207.52 "
Excess copper in 50-Centavos	174.47 "
Net copper required and used for entire melt	33.35 "
Melted by Mr. Borstadt; 66 Quarter Dollar ingots, Assayer reported melt at .8988	4037.20 "
Delivered to Coiner, Feb. 25, 1919	

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No. 575

2 Mint silver bars, Melt No. 197, at .999 $\frac{1}{2}$
 Mexican coin, Pesos (part of Deposit No.
 2159) at .901 $\frac{1}{2}$
 Ditto, 50-Centavos (part of Deposit No.
 2158), at .800
 Copper required to alloy fine bars
 " " Pesos

Total copper required

Excess copper in 50-Centavos

Net copper required and used for entire melt

Melted by Mr. Spencer; 86 Quarter Dollar ingots

Assayer reported melt at .8988

Delivered to Coiner, Feb. 25, 1919

1857.45 ozs.

600.80 "

1717.00 "

207.65 "

1.67 "

209.32 "

189.07 "

20.25 "

4059.25 "

No. 576

1 Mint silver bar, Melt No. 198, at .999 $\frac{1}{2}$
 " " " " 205 " .999 $\frac{1}{2}$
 1 " " " " " " " " " "

Total at .999 $\frac{1}{2}$
 Mexican coin, Pesos (part of Deposit No.
 2159) at .901 $\frac{1}{2}$
 Ditto, 50-Centavos (part of Deposit No.
 2158) at .800

Copper required to alloy fine bars
 " " Pesos

Total copper required

Excess copper in 50-Centavos

Net copper required and used for entire melt

Melted by Mr. Borstadt; 66 Quarter Dollar ingots

Assayer reported melt at .905 $\frac{1}{2}$

Melt clip-sampled and samples reported at .9007
 Feb. 27th, melt then weighing 4038.15 ozs. (to which 7.65 ozs.
 copper was added on assay of .9007 as by clip as above)

remelted by Mr. Borstadt into 54 Half Dollar ingots (the
 change to Half Dollar ingots having taken place on Feb. 24th).
 Assayer reported remelt at .898 and condemned it.
 March 3d, the 54 Half Dollar ingots (weighing 4058.55 ozs.) were
 added to make-up work as clippings, and entered into melts of
 that day as so much standard metal, the melts for that day
 being Nos. 623 to 631, inclusive, all of which were passed
 by the Assayer for delivery.

885.80 ozs.

783.80 "

1669.60 "

1201.40 "

1072.50 "

186.65 "

3.35 "

190.00 "

118.10 "

71.90 "

4039.40 "

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No. 577

Mexican coin, Pesos (part of Deposit No. 2159) at .901 $\frac{1}{2}$

3400.65 oz.

Copper required to alloy same

9.45 "

Melted by Mr. Spencer; 69 Quarter Dollar ingots

4230.75 "

Assayer reported melt .9988

Delivered to Coiner, Feb. 25, 1919

No. 578

Mexican coin, Pesos (part of Deposit No. 2159) at .901 $\frac{1}{2}$

3349.70 oz.

Copper required to alloy same

9.30 "

Melted by Mr. Borstadt; 69 Quarter Dollar ingots

4234.55 "

Assayer reported melt at .8988

Delivered to Coiner, Feb. 25, 1919

Recapitulation of Make-up

Total fine bars used

7193.25 lbs.

Total copper used

173.60 "

Tops, etc., brot. fwd. from Feb. 20

1442.00 "

Unmelted Pesos (Deposit No. 2159)

9764.20 "

" 50-Centavos (Deposit No. 2159)

4374.00 "

" " " " " 2163)

1598.55 "

Clippings

2097.95 "

Total charged to Melting room

27,233.55 "

Returns

6 melts of Quarter Dollar ingots

24,538.70 "

Tops, etc.

8,578.00 "

Assay samples

3.64 "

Total returned

27,218.34 "

Apparent loss for day

15.21 "

Respectfully,

B. H. Johnson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 24, 1920.

The Director of the Mint,
Washington, D. C.

Sir:

Your letter of April 17th, authorizing me to proceed to the United States Assay Office at New York, received this day. I am arranging to leave Denver not later than April 29th, and expect to be in New York on or before May 15th.

Respectfully,

B. M. Atkin

Superintendent Melting & Refining Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

April 24, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Referring to the nine condemned melts of the fiscal year,
1918, made on March 9, 1918,

			Weight	Reported
Melt No.	1270	66 Q.D. Ingots	4005.25	.8982
	1271	100 Dime "	4023.65	.8982
	1272	66 Q.D. "	4004.85	.8981
	1273	66 Q.D. "	4034.50	.8981
	1274	100 Dime "	4014.10	.8981
	1275	66 Q.D. "	4063.25	.8981
	1276	104 Dime "	4201.45	.8982
	1277	68 Q.D. "	4127.50	.8982
	1278	69 Q.D. "	4201.15	.8980

The above nine melts were condemned by the Assayer for low.
On March 11, 1918, the above condemned melt No. 1278 was re-
melted experimentally to prove original fineness, and was re-
turned by the Assayer as .8977, practically corresponding with
the original assay of same melt. On March 16, 1918, melts Nos.
1270 to 1278, inclusive, embracing the remelt of No. 1278, were
returned to the Ingot room and used indiscriminately as clippings,
all being approximately of clippings fineness. On said March
16th, ten melts, Nos. 1344 to 1353, inclusive, were made, and
were reported by the Assayer as follows:

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

Superintendent - 2

			Reported
Melt No. 1344	66 Q.D. Ingots		.8991
1345	66 " "		.8991
1346	66 " "		.8990
1347	66 " "		.8990
1348	66 " "		.8989
1349	66 " "		.8989
1350	66 " "		.8989
1351	66 " "		.8989
1352	71 " "		.8989
1353	62 " "		.8989

In order to correct the low fineness of the nine condemned melts, four and one-half ounces of copper alloy were dropped from each melt into which those condemned ingots entered.

At the end of the day, 4813.55 ounces of the above condemned ingots melts were returned unused, and were used in the same manner on March 18th, which finally disposed of them. The melts of the 18th were Nos. 1354 to 1368, inclusive, and were reported by the Assayer as follows:

Melt No. 1354	66 Q.D. Ingots	.8990
1355	66 " "	.8990
1356	100 Dime	.8990
1357	66 Q.D.	.8989
1358	66 " "	.8989
1359	100 Dime	.8989
1360	66 Q.D.	.8991
1361	66 " "	.8991
1362	100 Dime	.8992
1363	66 Q.D.	.8993
1364	66 " "	.8993
1365	100 Dime	.8993
1366	70 Q.D.	.8993
1367	68 " "	.8994
1368	100 Dime	.8991

Respectfully,

John H. H. H.
Acting Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

April 26, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

Complying with your request of this date, I wish to refer
you to the following:

My letter to you of September 19, 1919; my letter of September
26, 1919; my letter of October 24, 1919; my letter of November 12,
1919; anode sheets of October; anode sheets of November.

Trusting this will you the information you desire, I remain,

Respectfully,

B. J. Watson

Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 30, 1920.

Hon. Thomas Annear,
Superintendent, U.S. Mint,
Denver.

Sir:

Replying to your inquiry of this date, I beg to submit the following data about the Silver Bullion on hand:

Gross ozs.

256 Mint fine bars	213,103
117 Mexican coin bars (below standard)	122,954
Excess copper in Mexican bars	13,537
Copper required to alloy all fine silver on hand	23,882

In addition to the above there are 24 bars of Mexican Peso coins,
26,011 ozs., which will not require any fine silver in addition.

Respectfully,

J. H. MacIntosh
Acting Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 5, 1920.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

Following is statement of bullion suitable for manufacture of
Silver ingots on hand at close of business this day:

	Gross ozs.	Fine ozs.
Mint fine Silver	183,626.15	183,554.58
Mexican coin bars	151,852.17	125,216.74

The fine silver above is more than sufficient to take care of
coin
low grade Mexican bars.

Respectfully,

J. H. Ketchum

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

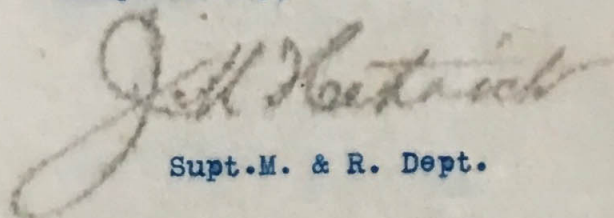
July 2, 1920.

Mr. Thomas J. Hathaway,
Chairman, Settlement Commission.

Sir:

I have the honor to report the apparent gain of silver in the manufacture of ingots during the fiscal year, 1919-1920, as being 2,099.75 fine ounces, which includes the loss of 239.03 fine ounces incurred in the correction of the lower fineness of the clippings from 434,024.10 fine ounces of Philadelphia ingots, which were treated by this Mint during the fiscal year just past.

Respectfully,



Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

July 3, 1920.

Mr. Thos. G. Hathaway,

Chairman, Settlement Commission:

Sir:

The following is a statement of apparent gains and losses in operations of the M. & R. Department for the fiscal year, 1919-1920:

Gains

	Gold	Fine ounces Silver
On Mass melting		1,598.63
" Fine gold bars	71.109	
" Dep. Weigh Clerk's grains	3.043	
" Delivery of Ingots		2,099.75
Total	74.152	3,698.38

Losses

On Mass melting	22.128	
" Dep. Weigh Clerk's grains		62.92

Gains

	74.152	
Net Gain, Gold and Silver	52.024	3,635.46

The gain on silver contained in deposits less than .008, silver, passed to Refinery: 8.26 fine ounces. This item is included in gain on mass melts above.

Respectfully,

John H. Hestrich
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 6, 1920.

Mr. Thos. G. Hatheway,

Chairman, Settlement Commission.

Sir

I have the honor to transmit the following summary of Minor Ingot operations for the fiscal year, 1919-1920:

Troy ounces

Nickel

Charged		3,414,906.00
Ingots	3,585,446.90	
Residue	<u>24,847.00</u>	<u>3,410,293.90</u>
Wastage		<u>4,612.10</u>

Bronze

Charged		8,032,305.40
Ingots	8,014,054.80	
Residue	<u>274.00</u>	<u>8,014,328.80</u>
Wastage		<u>17,976.60</u>

Respectfully,

J. H. Hatheway
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 6, 1920.

Thos. G. Hatheway, Esq.,
Chairman, Settlement Commission.

Sir:

Following is in explanation of the increased surplus in this department, June 30th, 1920, as compared with surplus of March 8, 1920:

	Fine ounces	
	Gold	Silver
Gains in massing deposits, etc., since Mch. 8	5.492	49.47
Gains, Assayer's Settlement	5.901	32.53
M. & R. Expl. #28	.622	
Ingot room flues, final clean-up	<u>42.860</u>	<u>50.00</u>
Total	54.875	132.00

Respectfully,

Jell. Ketchick
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

August 16, 1920.

Hon. Thomas Anheer,
Superintendent, U. S. Mint,
Denver.

Sir:

Replying to your Bureau letter of the 12th inst., the
apparent discrepancy in form 900, Fiscal year, 1920, of silver
operated upon is explained as follows:

Ingot	3,329,413.11	Fine ozs.
Tops etc., returns from Ingot melting and <u>remelted</u>	464,396.27	" "
Ingot Sweeps	233.90	" "
Wastage	<u>1,863.46</u>	" "
Total operated upon	<u>3,795,906.74</u>	" "

Respectfully,

J. M. Hettrich
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

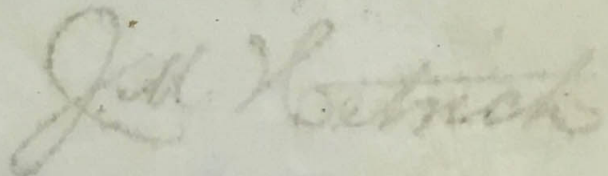
September 2, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint.

Sir:

I respectfully recommend that you approve the designation of Mr. Farnum St. John to act as Superintendent of the Melting and Refining Department, during my absence on vacation, commencing September 4th.

Respectfully,



Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 14, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

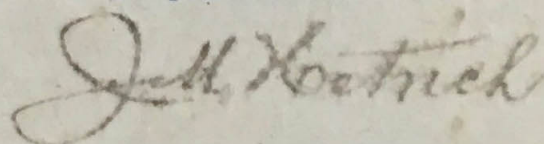
Sir:

Requisition is hereby made for the following blank books:

Form No.	Title	No. on hand	Number Wanted
193	Receipts and Delivery of Silver Bullion	None	1
194	Record of Ingot Melting	3	6

Sample pages are herewith attached.

Respectfully,



Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 18, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I have the honor to hand you herewith a brief sketch of the process of electrolytic refining of gold bullion, as requested in letter of Mr. Clark B. Carpenter, of the Colorado School of Mines, of date Sept. 22, 1920, and covering the points therein specified.

Respectfully,

J. H. Ketchum
Supt. M. & R. Dept.

Denver, Colo., October 18, 1920.

Brief report upon the parting and refining of Gold Bullion by the Electrolytic Process, as practiced at the U. S. Mint, Denver, Colorado.

- No. 1. Gold Chloride.
- No. 2. A. 50 gms. gold per litre. B. 3% hydrochloric acid.
- No. 3. Depends on fineness of bullion, per cent. acid in electrolyte, and current density. With 50 gms. gold per L., 3% HCl and bullion .850 to .875 fine in gold, .100 fine in silver, balance base, a temperature of 50 deg. to 55 deg. C. is sufficient.
- No. 4. Electrolyte is forced through a glass or hard rubber tube from bottom of one end of cell to top of other end by compressed air. A small tube is run to bottom of larger tube to introduce the air.
- No. 5. Strong gold chloride is added to the electrolyte in sufficient quantities so that strength of solution does not drop much below 50 gms. per L. before next addition of ~~mg~~ Au Cl₃. HCl is also added as required to keep up the strength of acid.
- No. 6. .4 to .5 amperes per sq. in. An alternating current is also run over the line in series with direct current forming pulsating current. No more gold is deposited than if it were not used. It is used to free the anodes of silver chloride formed, so that more silver may be present in anode without causing an evolution of chlorine gas. The amount of free densities HCl may also be reduced. The current ~~densities~~ ^{densities} ~~given~~ are for direct current only.
- No. 7. About .8 volt per cell.
- No. 8. A. $8\frac{1}{4}$ in. long, $3\frac{1}{2}$ in. wide, $\frac{1}{4}$ in. to $\frac{3}{8}$ in. thick, taper slightly to bottom and has ~~mm~~ $\frac{1}{4}$ in. hole at top. B. Average, 80 ozs. C. Gold hook--must be kept above level of solution. D. Corroded with silver chloride exchanged in about 36 hours. E. About 10%.

- No. 9. A. Length, $10\frac{1}{2}$ in.; width, $3\frac{1}{2}$ in.; thickness, .015 in.
 After bending over top for suspension on rod across cell and allowing for distance between solution and rod, there is a depositing surface of $3\frac{1}{2}$ in. by $6\frac{1}{2}$ in.
- B. About 4 ounces.
- C. Exchanged in about 36 hours.
- D. About 80 ounces.
- No. 10. As soon as one is taken out, it is immediately replaced with another, so as not to raise the current density too high on those remaining. When anodes are dissolved to about half their length or less, they are crowded on to one rod and replaced with new ones so that full anode surface may be maintained in each cell as nearly as possible.
- No. 11. A. Length, 18 in.; width, 13 in.; depth, $12\frac{1}{2}$ in. inside.
- B. Porcelain.
- C. Copper bus-bars to which gold strips .050 in. thick are fastened and which rest on hard rubber rods with iron cores extending across cells.
- D. One-half by one inch.
- E. 400 amperes per sq. in.
- No. 12. A. About 37% gold. Gold content of anode mud could be reduced greatly by washing free from AuCl_3 and screening to recover pieces of gold that break off anode and fall into slimes. This is not done, however, because slimes are the proper proportion of silver and base to part by nitric acid, or work back through the silver depositing cells, without so doing.
- B. About 37% gold, 53% silver, 10% base.
- C. About every seven days, or when mud reaches to bottom of anodes and cathodes, causing short circuits in cells.
- No. 13. Cathode gold should run .9997 to .9999 plus fine
- No. 14. The anode mud is washed until strong green color of copper chloride is gone from wash water. It may be washed free from gold chloride and lead chloride with hot water if desired and there is tank room available for taking care

-3-

of wash water and precipitating gold chloride from same. After a slight washing ~~of~~ as described above, the mud is transferred to a lead-lined tank and silver chloride is reduced with granulated zinc, which also reduces the gold chloride remaining with slimes.

The slimes are then washed free from all soluble base metals, dried, melted, and cast into anodes of the fineness described under No. 12 B. They are then put into the silver depositing cells where most of the silver and base are worked out, after which they are remelted as gold anodes, and returned to the gold depositing cells.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 23, 1920.

Electro Metallurgical Sales Corporation,
Forty-second St. Building,
New York.

Gentlemen:

(Attention H. A. Floyd)

Referring to your favor of October 19th, I would state, the quantity of manganese metal used in the correction of brittle Nickel or Bronze melts in this Mint is very slight indeed--100 lbs of silicon copper, and the same amount of silicon manganese, has supplied our requirements the past five years; so it would hardly be worth your consideration.

Very truly yours,

J. H. Hotrich
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 27, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

I would respectfully submit the following statement upon the quantities of copper and nickel furnished for the manufacture of Colombian coins:

Received

Copper, 140,542 avoird. lbs.
Nickel, 46,248 " "
Total, 187,390 " " or 2,732,770.83 Troy ozs.
Total copper and nickel equals 85,000,647.90 Grams

Required

15,000,000 - one-centavos, at 2 grams 30,000,000
20,000,000 - two-centavos, at 3 " 60,000,000

Amount received 85,000,647
Deficit 4,999,353 grams

4,999,353 grams equals 11,021 avoird lbs., making
8,266 avoird. lbs. Copper, and 2,755 avoird. lbs. nickel.

Respectfully,

J. H. Westrich
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 8, 1920.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

The amount of silver purchased under the Pittman act in the M. & R. department of this institution which is available for coinage, is 116,594.71 fine ounces. This amount is included in the estimate furnished you yesterday of the continuance of silver ingot melting.

Respectfully,

J. H. Keenan
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 21, 1921.

Mint Bureau in account with the United States Mint at Denver

1920

Gold, Fine ozs.

March Settlement, Dr. Balance

5.984

March 18, Fine Gold Special No. 1

.080

Total

6.064

April 17, Samples 5, 10, 15, 20,

Returned, Cr.

1.850

Balance Dr., June 30, '20

4.214

Jell H. Ketchum

Supt. M. & R. Dept.

A copy of each form or record blank is desired, with typical sample entries thereon which will show the maximum space required.

There should also be noted thereon:

The division or office in which used, and if the blank goes from one division to another, the divisions should be named in order.

The sources of entries; if from another form give its name and number, if from a memorandum, provide a sample of the same which carries indication of its source, etc., etc.

The purpose for which the information on the form is used.

Leaves should not be torn from record books unless the final leaves can be removed without damaging same, but separate sheets should be prepared to show the data contained thereon.

Mch 29/21

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 29, 1921.

List of Blank Forms and Books used by the M. & R. Department, Denver

Books

184 A	Record of Ingot Melting (for U.S. Nickel)
184 A	" " " " (for U.S. Bronze)
184 A	" " " " (for U.S. Silver)
184 A	" " " " (for Colombian coinage)
185	Record of Gold Ingot Melting
413 A	M. & R.'s Vault Register of Gold bars & Grains (adapted)
188	Receipt & Delivery of Gold Bullion
183	" " " " Silver "
740	M. & R. in account with the Superintendent
871	Refinery Gold Account
338	Gold Deposits Sent to the Refinery
869	Sent to Refinery -- Refinery Returns
963	Deposits Del'd to Supt. M. & R. Dept. (for use in holder)

Forms

899	Settlement Bullion Dept.
889	M. & R. Dept.'s Daily Balance
929	Melts for Parting
900-1	M. & R. Dept. Operation and Settlement Statement
900-2	" " " " " "
	Sample page of Daily blotter or Work book
	Memo. Receipt for Anodes
	" " " Refinery Returns (Fine metal)
	Daily Report of the Refinery

J. M. Hartwick
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 20, 1921.

Hon. Thomas Annear,
Superintendent, U. S. Mint,
Denver.

Sir:

As per your request of May 18th, I have the honor to report as follows upon melting standard silver dollar shavings received from the Coiner on May 19th:

Weight as received, Gross ozs.	3,326.25	
" after melting		
5 Bars	3,309.95	
Grains	3.10	
Assay	.68	3,313.73
Melting loss	12.52	
Fine ozs. Silver as charged upon delivery		2,993.63
Result after Melting (3,313.73 ozs. at .8957)		<u>2,968.10</u>
Net loss, fine ozs.		25.53
" " Std. "		28.35

Respectfully,

Assayer's report attached

John H. Smith
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 25, 1921.

Hon. Thomas Annear, Superintendent,
U. S. Mint, Denver.

Sir:

In compliance with orders in your letter of May 18th last, to receive silver shavings from Coiner in the same manner as applies to receipt of clippings, and report results to you, I am giving below the figures on three such lots of shavings received to date:

1921	Weight, ounces		Assay after mtg.	Charged	Fine ounces	
	Before mltg.	After mltg.				After mltg.
May 19	3,325.25	3,313.73	.8957	2,993.83		2,968.10
June 4	3,038.50	3,016.15	.896	2,734.85		2,702.47
24	<u>4,302.45</u>	<u>4,287.97</u>	.8983	<u>3,872.21</u>		<u>3,851.88</u>
	10,667.20	10,617.85		9,600.49		9,522.45
	<u>10,617.85</u>			<u>9,522.45</u>		
	49.35 melting loss		Loss	78.04	fine ozs.	
				86.71	std. "	

Respectfully,

J. M. Hedrick
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 2, 1921.

Mr. F. E. Wheeler, Assayer,
U. S. Mint, Denver.

Sir:

During the fiscal year just ended 11 mass melts containing 1325 small deposit bars and grains were made by this department, with the following results:

	Gross Wt.	Fine ozs.	
		Gold	Silver
Before melting	47,337.20	19,822.529	18,040.35
After "	<u>47,284.30</u>	<u>19,836.657</u>	<u>18,190.58</u>
Melting Losses	52.90		
Total Gains, Fine ounces		14.128	150.23

Respectfully,

J. A. Betrich

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

July 6, 1921.

Mr. Leonard Magruder,

Chairman, Settlement Commission.

Sir:

The departmental silver gain of 1,034.18 fine ounces on 828,117.32 ounces subsidiary silver ingots and 5,667,441.43 ounces S. S. Dollar ingots, total, 6,495,558.75 fine ounces, of which 400.00 fine ounces came from outside sources, leaving 634.18 ounces as the real gain, seems unusually small for the amount operated on, and may be partially explained by the fact that 2,401 ounces of copper alloy were dropped from the .899 calculated alloy in the standard silver dollar ingots alone. This would indicate low fineness of clippings from standard silver dollar ingots; also, possibly, a somewhat high report upon the silver bars employed in the make-up. The resulting ingots were not of a high fineness, as shown by list below.

In the 828,117.32 fine ounces of subsidiary ingots above, the actual drop of copper alloy for correction was but 40.75 ounces.

Fineness of Silver Dollar Ingots Reported by Assayer

Remelt - 1 at .8985

Passed, 9	at .8985
44	6
44	7
86	8
261	9
305	.899
279	.8991
189	2

Total

Passed, 138	at .8993
69	4
18	5
34	6
21	7
7	8
3	9
2	.900

1509

Respectfully,

J. M. Ketchick
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

July 6, 1921.

Mr. Leonard Magruder,
Chairman, Settlement Commission.

Sir:

The following statement is in explanation of the gain of 138.701 ounces in the gold account for the fiscal year, which is closely accounted for by outside gains largely from the clean-up of the old mill and floor in the sweeps cellar.

The gold bullion melted within the department (mass melts and light weight gold coins) amounted to but 35,000 ounces gross during the year. Following is a table of visible gains:

Expl. #1, from clean-up of sweeps mill	5.073
2, " refinery after '20 settlement	.505
8, ingot room king from sweeps	1.329
20, iron kings, various	12.974
21, kings from sweeps cellar	38.920
11 Mass melts, 1325 small dep. bars & grains, total gross wt., 47,337.20	14.128
Sweeps cellar clean-up bar	37.238
Gain, deposit grains for year	4.527
Dept. sweeps for year	<u>19.000</u>
Total	133.894

Respectfully,

J. H. Ketchum
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

August 29, 1921.

Additional Data requested by letter of Director of August 25, 1921.

Metals actually operated upon by the Melting and Refining Department, for
the fiscal year ended June 30, 1921:

	Fine ounces
Gold	27,621.010
Silver	6,715,065.80

	Troy ounces
Nickel (Minor Coinage)	637,037.59
Bronze	3,377,681.70
Nickel (Colombian Coinage)	4,239,424.89

Ingot Melts Made (See page 35, Annual Report of Director, 1920)

	Number of Melts			Fine ounces	
	Passed first melting	Remelted	Condemned	Melted	Passed
Silver	1735	1	0	6,683,698.71	6,495,558.75
				Troy ounces	
Nickel (M)	138	0	0	637,037.59	626,912.80
Bronze	819	0	0	3,377,681.70	3,355,914.70
Nickel (C)	1110	0	0	4,239,424.89	4,114,922.40

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Page 2

Melts for Fine Gold (See pp. 36 and 37, Director's Report, 1920)

1 Melt of Certificate Bars to merchant bars for Cashier, reported 1000
fine.

No Melts for Fine Silver made.

Respectfully,

Farman St. John

Acting Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 31, 1921.

Hon. R. J. Grant,
Superintendent, U. S. Mint.
Denver.

Sir:

Please accept my resignation as melter in the Mint, the same to become effective from and after September 20th, 1921.

If the Refinery of the Denver Mint should resume operations at any time, I should like to be considered in the matter of the foremanship of that department.

After October 1st, 1921, my address will be 1054 - 48th St., Emeryville, California.

Respectfully,

Geo. B. Bostad Jr.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 1, 1921.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver.

Sir:

In compliance with your request, I submit the following comparison of losses in melting "Baltimore" bars of the American Smelting and Refining Co., with bars of other plants, as follows:

Baltimore Bars

Aug. 5, 10, 12, 18, 22, 23 -- 185 melts, 337 bars used.	
Weight of bars melted	389,292.55 ozs.
Other metal melted	<u>399,491.93</u> "
Total	788,784.48 "
Total melting loss	395.32 "

Other Bars

Aug. 25, 26, 27, 29, 30, 31 -- 162 melts, 323 bars used.	
Weight of bars melted	344,000.35 ozs.
Other metal melted	<u>345,711.25</u> "
Total	689,711.60 "
Total melting loss	310.52 "

The foregoing figures show that the melting loss of the Baltimore bars was .0010154 per ounce, while that of the other bars was only .0009026, a difference of .0001128. The Baltimore bars averaged 1155 ozs.; so that the approximate loss per bar for moisture was at least .12 oz.

During the melting of the Baltimore bars several severe explosions from moisture in them took place, which led to our adopting the practice of thoroughly heating the second bar in each melt on top of the furnace before putting it in the crucible. While being thus dried out, moisture was plainly discovered on many of them, and 22 of them were reweighed showing a total loss of 9.45 ozs., an average of more than .40 oz. to the bar. One bar lost one ounce.

Respectfully,

Jarnum St John
Acting Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 2, 1921.

Estimate of Force required for 2 Shifts in M. & R. Dept.

DAY SHIFT 7.30 a.m. to 5.30 p.m. -- 10 hours, beginning Sept. 3

<u>Office</u>	<u>Make-up Room</u>	<u>Ingot Room</u>
St. John	Waters	Ryan
Dardis	Aurand	Lindhart Melter
	<u>1 other</u>	Baskind "
		Donahue "
		* Kosbel "
		* Russell "
		Carlisle
		Hoskins
		Duncan
		Bucher
		Hollinger
		Westervelt
		<u>2 others</u>

* Ryan will assist until these men are capable

To start, the day shift will run five furnaces and make five rounds of melts, or 25 in all.

NIGHT SHIFT 5.30 p.m. to 3.30 a.m. -- 10 hours.

<u>Office</u>	<u>Make-up Room</u>	<u>Ingot Room</u>
Spencer	1 helper	* Whitaker Melter
		Welsh "
		Annis "
		Huffaker
		Hayes
		Daley
		<u>1 other</u>

* Night foreman

The night shift will run three furnaces and make five rounds of melts, or 15 in all.
As the men become capable and the force is increased, the output will be increased accordingly.

Respectfully,

St. John
Acting Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 14, 1921.

Hon. R. J. Grant, Superintendent,

U. S. Mint, Denver.

Sir:

The services of the following employees of the M. & R. Department
can be dispensed with after Tuesday the 15th inst., viz:

Argall, W. A.

Brito, M

Barnholt, R. M.

Carlisle, J. P.

Crawshaw, G. C.

Crowell, G. W.

Compton, C.

Danford, C. W.

Dudley, L. H.

Froom, H. A.

Fleming, J. L.

Halbert, E. J.

Hutton, R. L.

Horne, J. E.

Herring, J. C.

Johansen, A. W.

McCutcheon, D. L.

McAllister, R. W.

McDoland, J. C.

Moffett, G. W.

Parker, E. L.

Phelps, S.

Page, W. J. A.

Stewart, C. B.

Shearer, B. L.

Saye, A. E.

Speer, D. M.

Smith, E. E.

Sellers, R. T.

Tressider, F.

Westervelt, F.

Williamson, W. L.

Wilson, J. H.

Wilmot, W.

Washburn, C. F.

Wilkinson, F. M.

Winbourn, T. H.

Respectfully,

Joannilson
Capt. M. S. B. Don

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 22, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver.

Sir:

Refinery copper melts on hand at this date, from 1919 settlement, melts 7 to 11, inclusive; and from 1920 settlement, melts 1 to 65, inclusive.

	<u>Gross ozs.</u>	<u>Ozs. Gold</u>	<u>Ozs. Silver</u>
1919	14,718.00	353.018	326.17
1920	<u>110,355.25</u>	<u>169.357</u>	<u>452.94</u>
Total	125,073.25	522.375	779.11
Out	<u>21,234.50</u>	<u>467.950</u>	<u>499.37</u>
	103,838.75	54.425	279.74

The "out" consists of the five melts of 1919 and three of 1920 that carry considerable gold and silver which we can extract in the refinery if desired.

Respectfully,

Joseph W. Milne

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

April 5, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver, Colo.

Dear Sir:

The criticisms of the Denver Mint, and particularly of the Refinery as to gold wastage led me to make a careful examination of the official reports of the Director of the Mint to ascertain the recorded facts relating thereto. Such facts, so obtained, are set forth in detail in three tabulations hereto attached and designated as Tables A, B, and C.

Table A exhibits gold gains and losses in fine ounces.

Table B shows fine ounces of gold bullion operated upon. These two tables cover fifteen years -- 1906 to 1920, inclusive.

Table C sets forth the amounts of gold bullion with and without charges, but only for eleven years, 1910 to 1920, inclusive, as the reports do not give any details about these items prior to 1910. Philadelphia is omitted from this table, as it operated only three of these years.

The Denver refinery began operations in the fiscal year 1906, and continued up to and including the year 1920, and my research covers these fifteen years in all government refineries. A summary of the tables shows the following facts:--

Table A

1. That Denver's net surplus was 1,675.080 fine ounces of gold.
2. That Denver's gross wastage was less than any other institution.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Supt. - 2,

Table A (continued)

3. That the greatest gold wastage in any one year was:

Denver	381.317	fine ounces of gold in 1914,	page 42
San Francisco	492.164	" " " " " 1909,	" 70
New York	662.870	" " " " " 1913,	" 52
Philadelphia	1,215.154	" " " " " 1908,	" 59

Table B

4. That the amount of gold bullion operated upon was as follows:

New York	32,595,860.254	fine ounces
Denver	22,538,669.405	" "
San Francisco	20,718,994.702	" "
Philadelphia	11,904,569.888	" "

Table C5. That the amount of gold bullion with charges was as follows:

Denver	14,737,036.569	fine ounces
New York	10,690,802.345	" "
San Francisco	7,769,541.423	" "

6. That the amount of gold bullion without charges was:

New York	20,218,894.110	fine ounces
San Francisco	9,496,312.434	" "
Denver	2,199,789.030	" "

7. And these figures show that the percentage of the total amount of gold bullion operated upon that carried charges--in other words--pay bullion--was as follows:

Denver	87	per cent.
San Francisco	47 $\frac{1}{2}$	" "
New York	34 $\frac{1}{2}$	" "

THE MINT OF THE UNITED STATES AT DENVER

MELTER AND REFINER'S DEPARTMENT

Supt. - 3

Table C requires further elucidation. In considering this table it is necessary to remember that the cost of operating the refineries is supposed to be covered by the "parting and refining" charges collected from depositors. The bullion without charges returns no revenue to the government, and practically all of it consists of, and for explanatory purposes only, will be classified as:

1. Refinery settlement bullion (including superintendent's sweeps bars, etc.).
2. Bullion, .992 fine and over, used to aid processes (including crude without charges).
3. Bullion, .999 fine and over, melted but not refined.

And to show the application: In 1920 (pages 34 and 35), Denver used 189,204.377 fine ounces of No. 1 and 11,723.917 fine ounces of No. 2, making a total of 200,931.594 fine ounces of non-paying bullion, as against 562,785.355 fine ounces with charges. San Francisco used 50,627.065 fine ounces of No. 1 and 351,582.156 fine ounces of No. 2, making a total of 402,209.221 fine ounces of non-paying bullion, as against 477,898.900 fine ounces with charges. New York used 746,696.106 fine ounces of No. 1 and 779,504.552 fine ounces of No. 2, and 1,346,973.785 fine ounces of No. 3, making a total of 3,173,174.443 fine ounces of non-paying bullion as against 1,025,945.955 fine ounces of gold bullion with charges. The No. 3 bullion should never have been credited to refinery operations, but the reports show that it was and it is therefore included in the foregoing figures. Denver never had any No. 3 bullion and only a few thousand ounces of No. 2, and that was used in making gold chloride; so it always has been necessary for

THE MINT OF THE UNITED STATES AT DENVER,

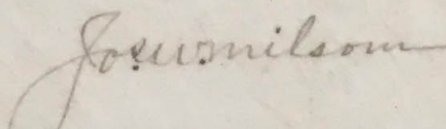
Supt. - 4

MELTER AND REFINER'S DEPARTMENT.

Denver to use the utmost care in operating the silver cells so that their product could be worked through the gold cells; and even then our gold anodes run only about .870 to .900 fine; I am credibly informed that in the other refineries (probably with the assistance of No. 2 bullion) they run from .930 to .960 fine. Under these conditions the difficulties of operation are greater than the said differences in fineness indicate.

A fair consideration of the foregoing official figures, together with the additional statement that Denver, for said years, returned an actual surplus of 28,399.52 fine ounces of silver, and that Denver's gross wastage in both gold and silver was less than that of any other institution, must lead to the conclusion that those who criticised Denver were not correctly informed as to the true facts regarding our refinery work.

Respectfully submitted,



Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 12, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver, Colo.

Dear Sir:

The criticisms of the Denver Mint, and particularly of the Refinery as to gold wastage, led me to make a careful examination of the official reports of the Director of the Mint to ascertain the recorded facts relating thereto. Such facts, so obtained, are set forth in detail in three tabulations hereto attached and designated as Tables A, B, and C.

Table A exhibits gold gains and losses in fine ounces.

Table B shows fine ounces of gold bullion operated upon. These two tables cover fifteen years -- 1906 to 1920, inclusive.

Table C sets forth the amount of gold bullion with and without charges, but only for eleven years, 1910 to 1920, inclusive, as the reports do not give any details about these items prior to 1910. Philadelphia is omitted from this table, as it operated only three of these years.

The Denver refinery began operations in the fiscal year 1906, and continued up to and including the year 1920, and my research covers these fifteen years in all government refineries. A summary of the tables shows the following facts:-

Table A

1. That Denver's net surplus was 1,875.080 fine ounces of gold, which exceeded the net surplus of New York.
2. That Denver's gross wastage was less than any other institution.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Supt. - 2

Table A (continued)

3. That the greatest gold wastage in any one year was:

Denver	381.317	fine ounces of gold in 1914,	page 42
San Francisco	492.184	" " " " " 1909,	" 70
New York	662.870	" " " " " 1913,	" 52
Philadelphia	1,215.154	" " " " " 1908,	" 59

Table B

4. That the amount of gold bullion operated upon was as follows:

New York	32,595,880.254	fine ounces
Denver	22,538,689.405	" "
San Francisco	20,718,994.702	" "
Philadelphia	11,904,569.886	" "

Table C5. That the amount of gold bullion with charges was as follows:

Denver	14,262,375.552	fine ounces
New York	10,690,802.345	" "
San Francisco	7,769,541.423	" "

6. That the amount of gold bullion without charges was:

New York	20,218,894.110	fine ounces
San Francisco	8,498,312.434	" "
Denver	2,674,450.047	" "

7. And these figures show that the percentage of the total amount of gold bullion operated upon that carried charges--in other words, pay bullion--was as follows:

Denver	84	per cent.
San Francisco	47 $\frac{3}{4}$	" "
New York	34 $\frac{1}{2}$	" "

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Table C requires further elucidation. In considering this table, it is necessary to remember that the cost of operating the refineries is supposed to be covered by the "parting and refining" charges collected from depositors. The bullion without charges returns no revenue to the government; and practically all of it consists of, and for explanatory purposes only, will be classified as:

1. Refinery settlement bullion (including superintendent's sweeps bars, etc.).
2. Bullion, .992 fine and over, used to aid processes (including crude without charges).
3. Bullion, .999 fine and over, melted but not refined.

And to show the application: In 1920 (pages 34 and 35), Denver used 189,204.677 fine ounces of No. 1, and 11,726.917 fine ounces of No. 2, making a total of 200,931.594 fine ounces of non-paying bullion, as against 562,785.355 fine ounces with charges. San Francisco used 50,627.065 fine ounces of No. 1, and 351,582.156 fine ounces of No. 2, making a total of 402,209.221 fine ounces of non-paying bullion, as against 477,898.900 fine ounces with charges. New York used 746,696.106 fine ounces of No. 1, and 779,504.552 fine ounces of No. 2, and 1,646,973.785 fine ounces of No. 3, making a total of 3,173,174.443 fine ounces of non-paying bullion, as against 1,025,945.955 fine ounces of gold bullion with charges. The No. 3 bullion should never have been credited to refinery operations, but the reports show that it was and it is therefore included in the foregoing figures. Denver never had any No. 3 bullion and only a few thousand ounces of No. 2, and that was used in making gold chloride; so it always has been necessary for

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Supt. - 4.

Denver to use the utmost care in operating the silver cells so that their product could be worked through the gold cells; and even then our gold anodes run only about .870 to .900 fine; I am credibly informed that in the other refineries (probably with the assistance of No. 2 bullion) they run from .930 to .960 fine. Under these conditions the difficulties of operation are greater than the said differences in fineness indicate.

A fair consideration of the foregoing official figures, together with the additional statement (obtained from said Directors' reports) that Denver for said years returned an actual surplus of 28,699.12 fine ounces of silver, which exceeded that of New York, and that Denver's gross wastage in both gold and silver was less than that of any other institution, and that the total amount of gold and silver bullion operated upon in Denver was exceeded by only one place (New York); must lead to the conclusion that those who criticised Denver were not correctly informed as to the true facts regarding our refinery work.

Respectfully submitted,

J. W. Milson
Superintendent M. & R. Department.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 14, 1922.

Hon. R. J. Grant,
Superintendent U. S. Mint,
Denver.

Dear Sir:

I know of no way to ascertain the comparative costs of refining bullion, because the "cost reports" of the Mints do not seem to have been preserved in the chief clerk's office, and the Directors' reports are silent along this line. However, a careful research of my office files has disclosed a little data on the subject relating to the fiscal years 1911 and 1913.

On the back of my original annual settlement statement for the year 1911, I found the following endorsement:

	Average per crude ounce.		
	Philada.	San Francisco	Denver
" Average Refining			
" costs per oz. for	.024504	.023559	.019852
" 1911 Fiscal		Average per ounce operated upon.	
"	.017412	.013262	.011874
" Denver's cost per "crude" ounce was			
" 81% of Philadelphia, and			
" 74% " San Francisco.			
" Denver's cost per ounce "total operated" was			
" 68% of Philadelphia, and			
" 89% of San Francisco.			

I also found a carbon copy of my report on the amount of ingots

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Supt. - 2

and average cost per ounce for the year 1913, on which I had written the costs for said year of other mints, both as to ingots and refinery. The headings and first cross line of the following figures are taken from the typewritten copy, and relate to Denver costs; all the other items quoted, commencing with the word "Philadelphia" show the written endorsement on said copy:

	Gold	Silver	Nickel	Bronze	"
"	.002355	.002322	.002640	.002445	"
" Philadelphia	.002797	.002605	.002760	.002094	"
" San Francisco	.002668	.003562	.004156	.003272	"
" Refinery		Cost of Crude		Amt. Op. Upon	"
" Denver		.020302		.012609	"
" San Francisco		.054978		.024058	"
" New York June		.211933		.047363 cal.yr.	"

I think the New York figures are for the month of June only, and probably represent settlement expenses with little production.

I have no way of checking the foregoing figures, but they were undoubtedly taken from the original cost reports by myself, and I believe they are correct.

Further, I did not find any other data of any kind touching this question.

Respectfully,

Jewmilsom
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 4, 1922.

Maurice A. Knight,
Kelly Ave.,
East Akron, Ohio.

Dear Sir:

Will you please advise us as to the cost of the articles hereinafter described, and as well how soon they can be delivered after your receipt of an order:

Figure 201. Acid-proof standard straight side jar, twenty-one (21) inches deep, and twenty-one and one-half ($21\frac{1}{2}$) inches diameter, with handles, but without lip or outlet.

Figure 201. Small jars, sixteen (16) inches diameter and fourteen (14) inches deep, without lip, handles, or outlet.

Figure 228. Acid-proof standard tank, thirty-four (34) inches long and twenty (20) inches both wide and deep, with one inch flange on inside; the top of ~~same~~ ^{flange} to be two and one-half ($2\frac{1}{2}$) inches above bottom of tank, and an outlet at center of one end, the bottom of same to be one-eighth ($1/8$) inch above bottom of tank, and outlet to taper from two (2) inches outside diameter to one and one-half ($1\frac{1}{2}$) inches inside diameter.

All dimensions given are inside measurements, and figures need not be exact, but must be approximate.

The large jars are to be used in making silver nitrate, and the rectangular tanks are to be used mostly for filters in washing various products of both nitric and hydrochloric acid operations. We

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Knight - 2

shall probably need three of the large jars and six each of the
tanks and small jars.

Yours truly,

Joel W. Milson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

May 4, 1922.

General Ceramics Co.,

50 Church St., New York City.

Gentlemen:

Will you please advise us as to the cost of the articles hereinafter described and as well how soon they can be delivered after your receipt of an order:

Fig. 110. Cylindrical jars, twenty-one (21) inches deep and twenty and one-half ($20\frac{1}{2}$) inches diameter, with shell handles but without lip or outlet.

Fig. 110. Small jars, sixteen (16) inches diameter and fourteen (14) inches deep, without lip, handles or outlet.

Fig. 299. Rectangular tank, thirty-four (34) inches long and twenty (20) inches both wide and deep, with one inch flange on inside, the top of same to be two and one-half ($2\frac{1}{2}$) inches above bottom of tank, and an outlet at center of one end, the bottom of same to be one-eighth ($1/8$) inch above bottom of tank, and outlet to taper from two (2) inches outside diameter to one and one-half ($1\frac{1}{2}$) inches inside diameter.

All dimensions given are inside measurements, and figures need not be exact, but must be approximate.

The large jars are to be used in making silver nitrate and the rectangular tanks are to be used mostly for filters in washing various products of both nitric and hydrochloric acid operations in electrolytic refinery.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

G. C. Co. - 2

We shall probably need three of the large jars and six each
of the tanks and small jars.

Yours truly,

J. W. Milson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

June 30, 1922.

Hon. R. J. Grant,

Superintendent, U. S. Mint,

Denver.

Sir:

The gold surplus of the M. & R. Department of the Denver Mint for the fiscal year ending this day, is 46.884 fine ounces; and the silver surplus is 3,001.77 fine ounces.

The gold surplus accrued from the following sources of gain:

Mass melts	7.752
Assayer's surplus	4.880
Vault sweepings	2.492

and the remainder from mill and sweeps cellar recoveries.

The silver surplus was obtained from gains on Mass melts, 196.93 ozs., and Vault sweepings, 14.54 ozs.; total, 211.47 ozs., less assayer's wastage of 28.61 ozs.; net gain from these sources, 182.86 ozs.; and the remainder of the surplus accrued from gains in making 29,765,822.53 standard ounces of silver ingots.

Respectfully,

John W. Wilson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

August 31, 1922.

Hon. R. J. Grant,
Supt., U. S. Mint,
Denver.

Sir:

The following employees are working in the Ingot room under temporary appointment:

William Hollinger

E. C. Huffaker

R. G. Russell

A. E. Eggert

A. L. Dailey

Fred Westervelt

R. J. Hoskins

J. C. Hayes

Geo. Koebel

N. B. Batchelor

J. E. Horne

E. L. Shearer

J. P. Carlisle

E. L. Parker

D. L. McCutcheon

Fred Annis

M. H. Winans - G. J. Bucher

Respectfully,

John W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 9, 1922.

Hon. R. J. Grant,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

A letter from the Bureau of the Mint under date of August 31st states that the report of the Superintendent of the M. & R. Department for the fiscal year 1922,

"on form No. 900, does not carry, under ingot melting room
"operations, the weights of metals passed on the first melting,
"those condemned, those remelted, etc."

That is true, but it was not an omission, as there is no place provided on said form No. 900 for such data, nor had we ever before received any intimation that the Bureau desired it.

The information requested in said letter follows:

Passed on first melting, standard ounces,	29,283,261.45
Remelted,	" "
Condemned,	" "
	482,660.40
	41,112.10

Respectfully submitted,

J. W. Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

September 9, 1922.

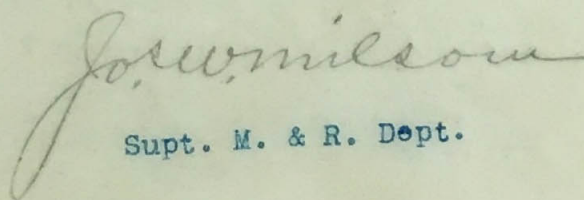
Hon. R. J. Grant,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

We have made a careful test of the Special Dixon Crucible recently delivered to us for that purpose. We used it with two of our best melter^s and in two furnaces. It commenced to scale at the seventh melt, and some of the scales breaking loose fell to the bottom of the furnace ^{and} fused to the pedestal. We used it for twelve melts, and probably it would have stood up for three or four more, but not to exceed sixteen in all. The average time on the first melt was 110 minutes, and subsequent melts 85 to 90 minutes each, which averages about 20 minutes longer to each melt than the crucibles we are now using. Its capacity is at least 300 ounces less than the Bartley crucible, which necessitates very careful stirring with our present size of melts.

These results show that the tested crucible is not near as fast as the crucibles we now have, nor is its life any longer. Therefore, in comparison with the crucibles we are now using the Dixon crucible would be uneconomical and unsatisfactory.

Respectfully submitted,



Supt. M. & R. Dept.

September 13, 1922.

Hon. R. J. Grant, Superintendent,
United States Mint,
Denver, Colorado.

Sir:

The annual reports of the Melting and Refining Department for the years 1906-1920 inclusive, show that the Parting and Refining charges collected on bullion actually operated upon in the Denver Refinery during those years amounted to\$1,022,638.40.

In five of these years monthly cost reports were furnished to the Mint Bureau and from these reports I have compiled the following facts regarding parting and refining charges earned and costs of operating the Refinery in said five years, - (said costs include salaries, labor, repairs, supplies, new equipment and all other items chargeable to Refinery operations), to-wit:

<u>Fiscal Year</u>	<u>Refinery Costs</u>	<u>P. & R. Charges Collected</u>
1910	\$45,511.07	\$ 60,565.82
1911	46,955.46	78,509.37
1912	42,353.81	75,809.03
1913	47,056.38	71,995.43
1914	44,721.51	92,090.55
	<u>\$226,598.23</u>	<u>\$378,970.20</u>

5 years:

These figures show that for five consecutive years the average cost of operating the Refinery was 59.79 per centum of the Parting and Refining charges collected on the bullion operated upon, and if said average would obtain for the fifteen years that we operated the Refinery, the profit on P. & R. charges alone would be \$411,202.89, and with the addition of surplus bullion returned and by-products recovered the net profit to the Government would exceed half a million dollars.

Respectfully submitted,

John Wilson
Supt. M. & R. Department

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

September 25, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver, Colo.

Sir:

Complying with your request of recent date, we made a careful test of the Dixon sample crucible sent to this mint in 1921. We used it in our regular work in furnaces Nos. 4 and 5, alternating daily. It commenced to scale during the fifth melt, and at the end of the twelfth melt began chipping off at the top, and was then considered unsafe for further use.

We not only kept a complete record of the Dixon crucible, but also of the Bartley crucible that we were alternating with. The Dixon made 12 melts in a total furnace time of 1070 minutes, being an average of 89 minutes plus to the melt. The Bartley made its 12 melts in a total furnace time of 805 minutes, being an average of 67 minutes plus per melt; and we continued to use it for 7 additional melts, making a total of 19 melts from this Bartley crucible, and it was then in better condition than the Dixon was at the end of 12 melts. After making 19 melts the Bartley crucible weighed 502.4 Troy ozs., and the Dixon crucible after making 12 melts weighed 407.3 Troy ozs. The time consumed in making the respective melts was in minutes as follows:

Melts	Dixon	Bartley
1	90	65
2	90	50
3	90	50
4	75	60
5	115	95
6	90	70
7	85	70
8	75	60
9	120	95
10	80	65
11	90	65
12	70	60
13		95
14		65
15		65
16		60
17		95
18		70
19		65

Respectfully submitted,

J. W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER.

MELTER AND REFINER'S DEPARTMENT.

October 10, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver, Colo.

Sir:

On June 30th, 1922, we had in settlement 357,135.69 Troy ounces of copper. Since that date we have used 495,965.20 ounces in making silver dollar ingots, leaving the balance charged against us 461,170.49 ounces, which includes the copper contained in uncurrent minor coin on hand, amounting to 125,625.93 ounces, and leaving a net balance of 335,544.51 ounces available for alloy purposes. Of this amount less than 200,000 ounces is the thin bridge ingots which are the only kind that can be economically used in our present work. We are using more than 8,000 ounces each day; so that we have on hand sufficient thin bridge copper to last approximately one month.

Now as to the difference in our work between thin bridge copper and thick bridge copper ingots: All copper ingots must be cut, as a silver ingot melt never contains as much copper as one copper ingot, unless it should happen to be a three-bar melt. Most of our fine silver bars are too large to go down to the bottom of the crucible; or, if they do, they fit so tightly that when the heat is applied they expand and frequently crack the crucible causing leaks which are very expensive and which interferes with expeditious work. So we cut the copper ingots and put the copper in the bottom of the crucible and the silver bar on top of it, and as the silver melts first there is no chance for the expansion of the metal to injure the crucible.

THE MINT OF THE UNITED STATES AT DENVER,

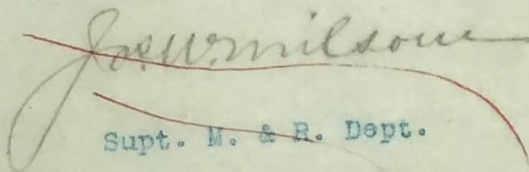
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 3

The thickness of the bridge in what we call the thin or low bridge copper is about half an inch, and the make-up room helpers cut it with a few cuts of a cold chisel and then a hammer-blow or two to break it, and it is ready for use. The thickness of the bridge in what we call the thick or high-bridge copper is about ^{and a half} two inches, and it would be an endless task to cut it with a chisel, and we have no machinery that will do the work.

Some years ago we did cut some of the high-bridge copper on the hydraulic press belonging to the refinery, but as it was continually wrecking the press we had to quit using it. So it is evident from the foregoing that the low-bridge copper can be used at very much less expense than the high-bridge copper. The stock of high-bridge copper on hand is comparatively small and will be gradually consumed by melting for scrap to make weights.

Respectfully submitted,


Supt. M. & R. Dept.

See following letter - this one not delivered - JMM

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 10, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver, Colo.

Sir:

On June 30th, 1922, we had in settlement 957,135.69 Troy ounces of copper. Since that date we have used 495,965.20 ounces in making silver dollar ingots, leaving a balance on hand of 461,170.49 ounces available for alloy purposes. Of this amount less than 200,000 ounces is the low-bridge ingots which are the only kind that can be economically used in our present work. We are using more than 8,000 ounces each day; so that we have on hand sufficient low-bridge copper to last approximately one month.

Now, as to the difference in our work between low (or thin) bridge copper and high (or thick) bridge copper ingots: All copper ingots must be cut, as a silver ingot melt never contains as much copper as one copper ingot, unless it should happen to be a three-bar melt. Most of our fine silver bars are too large to go down to the bottom of the crucible; or, if they do, they fit so tightly that when the heat is applied they expand and frequently crack the crucible causing leaks which are very expensive and which interfere with expeditious work. So we cut the copper ingots and put the copper in the bottom of the crucible and the silver bar on top of it, and as the silver melts first there is no chance for the expansion of the metal to injure the crucible.

The thickness of the bridge in the low-bridge copper is about half an inch, and the make-up room helpers cut it with a few cuts of

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

a cold chisel and then a hammer-blow or two to break it, and it is ready for use. The thickness of the bridge in the high-bridge copper is about two and a half inches, and it would be an endless task to cut it with a chisel, and we have no machinery that will do the work. Some years ago we did cut some of the high-bridge copper on the hydraulic press belonging to the refinery, but as it was continually wrecking the press we had to quit using it. So it is evident from the foregoing that the low-bridge copper can be used at very much less expense than the high-bridge copper. The stock of high-bridge copper on hand is comparatively small and will be gradually consumed by melting for scrap to make weights.

Respectfully submitted,

Joel Wilson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

October 14, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver.

Sir:

Yesterday the Cashier transferred to this department 14,314.04 standard ounces of light weight U. S. gold coin, and 4,792.74 standard ounces of uncurrent gold coin, making a total weight of 19,106.78 standard ounces, which was charged to us at standard fineness; that is, we were charged with 17,196.102 fine ounces of gold.

The Assayer's certificate, however, shows that the bars resulting from the melting of said coin were uniformly of a fineness of only .8996, and therefore this department suffers an actual loss of 7.644 ounces of fine gold through the aforesaid transaction.

I desire to call your attention to the matter at this time, because of the probability of the continuance of like transactions in the future which might cause a serious loss to this department.

Respectfully submitted,

Joseph Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 23, 1922.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver.

Sir:

Yesterday afternoon, R. C. Waters, a helper in the Make-up room found a small piece of metal in the lower corridor among the copper ingots; it weighed 0.95 of an ounce, and assayed .8996 fine in gold.

It appears to be a piece cut off across the end of a gold ingot after it had been topped, and one end of the piece found was cut off presumably for an assay sample, as that was sometimes done at the request of the Assayer for check samples.

The only gold ingots made in this Mint since 1914 was fifteen melts of light weight gold coin in January, 1919; and in July and October of the same year ingots for Peruvian gold coin. But the latter are eliminated from consideration, as their fineness was 916-2/3, gold.

The copper where this piece was found was stacked at that particular place, in the fall of 1920, at least one and a half years after we made the last standard gold ingots.

Respectfully submitted,

John Wilson

Superintendent M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 1, 1923.

Hon. R. J. Grant,
Superintendent, U. S. Mint,
Denver.

Sir:

The amount of Pittman fine silver on hand this morning is 1,714,809 ounces, which is sufficient to supply our needs for ingot purposes at the present rate of coin production (100,000 dollars per day) up to and including February 24th. To continue at the same speed thereafter and up to April 1st will require the purchase for our use of 2,410,000 ounces.

To continue at the same speed to June 20th will require the purchase of 7,870,000 ounces. To continue at our present speed from February 26th to March 31st, and thereafter at normal speed (about 35,000 dollars daily) to June 20th, will require the purchase of 4,280,000 ounces.

Respectfully,

Jo. W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 3, 1923.

Hon. R. J. Grant,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

On September 14th we began operations in the Refinery, with eight vertical silver cells; and on October 5th we began operating three flat silver cells. On September 24th we commenced work on the gold side with six cells, and the next day we added six more, making twelve in use up to October 10th when we added eight more, making the total now in use twenty cells.

In the month of October we sent to the Refinery 356,408.70 gross ounces of bullion, containing 142,466.595 fine ounces of gold, and 170,373.30 fine ounces of silver.

We received from the Refinery during last month 122,693.774 fine ounces of gold, and 123,549.55 fine ounces of silver.

The average fineness of the gold was .9998 plus; of silver, .9996 plus.

The P. & R. charges collected on the bullion sent to the Refinery in October were \$5,396.54, and would have been much larger had it not been for the fact that we were working up the 1920 refinery settlement bullion.

Respectfully,

John Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 9, 1923.

Mr. Herbert D. Coleman,
Supt. M. & R. Dept., U. S. Mint,
Philadelphia, Pa.

Dear Sir:

I have been informed that three or four years ago you began using "No. 4 Boronic Copper $3\frac{1}{2}$ " in your ingot work. Have you ever used it in gold or silver ingot work? and, if so, how about its action? What per cent. of the copper content is the Boronic copper, in your practice?

If you found it beneficial and helpful, will you please advise me fully, and as soon as convenient, and greatly oblige,

Yours truly,

Frederick C. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

November 9, 1923.

Mr. Fred A. Chaffin,
Chief Clerk, U. S. Mint,
Philadelphia, Pa.

Dear Fred:

Some years ago I used several articles in the Refinery work,
made from Monel metal purchased in your city. It now seems that
control of the manufacture of Monel metal supplies has gone to some
new person or firm, and I am very anxious to get their address.
Will you be kind enough to supply me with it, and greatly oblige,

Yours sincerely,

Joe Wilson

Supt. M. & R. Dept.

Silver { ~~BARS.~~
INGOTS.

U. S. Mint, May 18, 1926

To the Mr R

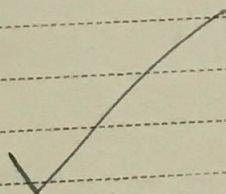
I certify that I have this day assayed 10 melts of { ~~Bars,~~
Ingots, } and
that the following numbers are of a proper fineness to be delivered to the

NUMBER.			FINENESS.			NUMBER.			FINENESS.			NUMBER.			FINENESS.		
822	899	1	827	899	3												
823	899	1	828	899	4												
824	898	9	829	899	1												
825	899	0	830	899	1												
826			831	899	0												

CPH Almaden, Assayer.

CONDEMNED INGOTS.

Remelt # 826, High 899.8 - Low 899.1



THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 13, 1923.

Mr. E. P. Leech, Acting Superintendent,
U. S. Mint, Denver.

Sir:

The shipment of chemical stoneware recently received from Maurice A. Knight, Akron, Ohio, has been carefully inspected by the Foreman of the Refinery, my assistant, and myself, and confirming the verbal report I made on the 7th inst., I now present the facts in writing for your consideration.

The original order was for 6 small jars, 3 large jars, and 8 standard tanks. The 6 small jars were all received and are apparently all right. The 2 large jars received (one missing) were also apparently all right. Of the 8 large tanks, all were received, but 6 of them were damaged, to wit:

Three of them were cracked on two corners, one of the cracks going down about 12 inches. One was cracked on one corner, the crack going down about 7 inches. One was cracked on three corners. One had a small top crack on one corner and the filter ledge was cracked on the other corner of the same end. The latter tank we can use, and that with the two good ones makes three out of the lot of eight that are suitable for our purposes.

All of the cracks referred to, except the filterledge, had been factory-patched apparently, as the cracks were filled in with material resembling in color that of the tanks, which had set hard; but on one corner the filling had broken off on top and exposed the crack about an eighth of an inch wide.

Respectfully submitted,

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

November 28, 1923.

Mr. E. P. Leech,
Acting Superintendent U. S. Mint,
Denver, Colo.

Sir:

The three large tanks recently purchased from M. A. Knight of East Akron, Ohio, were placed in use last week, and two of them are all right. But the third one leaked water through the bottom at the end under the discharge opening, but not a drop came through the opening. It is absolutely worthless, and we have discarded it. The cracks, if that is the defect, did not show at the time of our original inspection, nor do they now, but it won't hold water. We should like this to be replaced with a new tank.

Respectfully,

J. W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

December 5, 1923.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

At the conference with the Director of the Mint in your office this forenoon, an understanding was reached regarding certain changes in the M. & R. department, and in conformity therewith I recommend:

That Patrick Ryan be demoted from Foreman of the Ingot melting Room at \$7.00 per day, to the position of a melter at \$5.00 per day.

That William M. Bush be promoted from the position of melter at \$5.00 per day to the position of Foreman of the Ingot Melting Room at \$6.50 per day.

That the pay of Xerxes T. Stoddard, Foreman of the Refinery Melting Room, be increased from \$6.00 to \$6.50 per day, to conform with the pay of other foremen.

That the foregoing changes in position and pay become effective on the 16th day of this month.

Respectfully,

James M. ...
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

December 11, 1923.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

We have had a little trouble withour gold ingots occasionally, and in trying to ascertain the cause, among other things, we had the alloy copper analyzed, with the following results:

1st.	98.46%	Copper
2nd.	97.47%	"
3rd.	98.99%	"
4th.	98.92%	"

This is not up to standard.

We should like very much to try the same kind of copper now being used at the San Francisco Mint, that is, the original cathodes, unmelted. One ton will be ample for our tests.

Respectfully,

See Wilson

Supt. M. & R. Dept.

Melting and Refining Department

U. S. Mint, Denver

December 18, 1923.

Mr. J. C. Bates and
Mr. Hugh F. Rippetto,
Settlement Officers,
U. S. Mint, Denver.

Sirs:

The operations of the Melting and Refining Department from July 1, 1923, to date, resulted as follows:

	Gold		Silver	
	Surplus	Wastage	Surplus	Wastage
Refinery				
Ingot	29.691	66.755	1038.59	486.03
Assay		5.697		85.80
Deposit Grains				
Account	2.691			12.48
Totals	32.382	72.452	1038.59	584.31
		32.382	584.31	
Net		40.070	454.28	

The departmental results, as checked by the Commission, disclose a wastage of 34.409 ounces Gold, and a surplus of 512.59 ounces of Silver. The difference of 5.661 ounces Gold and 58.31 ounces Silver accrued from many small pick-ups, which is not unusual, but cannot be classified.

In making our clean-up of the Refinery, we did not completely wreck it, as that would have required much more time, and as well delayed the resumption of operations. Therefore we did not clean out the alley tank, nor settling sump, nor the furnace stack, nor the air course to the fan; and we tore out only one of the four furnaces in the melting room. Considering these conditions, we believe the loss incurred in the Refinery would have been recovered if we had had the time to make a thorough clean-up.

In the Ingot room, having plenty time to do so, we cleaned out

-2-

the furnace stacks (which had not been done since 1920), and that accounts for the gold and silver surplus in that department.

The loss in the Assay department is unusual. The deposit grains account is about normal.

Respectfully,

Josephine Lamm

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

December 31, 1923.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

We now have on hand, available for making dime ingots, the following items of silver:

	Fine ozs.
Uncurrent silver coin	40,923.31
Purchase bars	152,733.49
Mint fine bars	297,303.28
Commercial bars	<u>15,880.00</u>
Total	<u>506,840.08</u>

We also have on hand 393,713.09 Troy ounces of nickel, which is sufficient with the necessary copper to make one and a half million ounces of nickel ingots.

We also have 30,642.66 ounces of tin and 45,964.01 ounces of zinc, which is sufficient with the necessary copper to make one and a half million ounces of bronze ingots. To use up the said nickel will require forty tons of copper, and to use up the said tin and zinc will also require forty tons of copper, making a total of eighty tons of copper for minor coinage purposes.

Respectfully,

John Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 7, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint, Denver.

Sir:

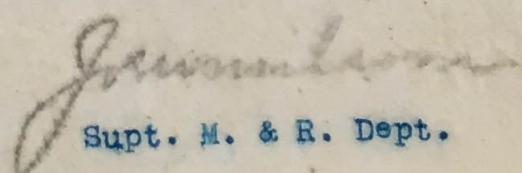
I have carefully considered the letter (which is herewith returned) of Hon. M. J. Kelly, Superintendent of the U. S. Mint at San Francisco, answering yours of the 28th ult., with reference to alloy copper for gold ingot work.

Mr. Kelly's statement is direct and quite conclusive in confirmation of the opinion we have so frequently expressed, that some at least of our gold ingot trouble was caused by impure alloy copper. He refers to past gold ingot trouble in the San Francisco Mint, and from experience points the way out.

We are very anxious to reduce our troubles to a minimum, and to that end I suggest the immediate purchase of five tons of cathode copper from the Tacoma plant of the American Smelting and Refining Co. This amount will be sufficient to last us to the end of the fiscal year, at our present schedule of work on gold ingots, as we use a little more than a ton each month.

Thanking you for your prompt attention to this matter, I remain,

Respectfully,


Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 8, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint, Denver.

Sir:

We now have on hand 52,954 ounces of mutilated and uncurrent silver coin. Owing to the increased danger of keeping bullion in this form, it has been our custom to melt such coin as soon as convenient and cast it into bars or ingots. If we cast it into bars, then when we want to use it we must again melt it to make into ingots, thus causing an extra melt with its attendant loss.

The Coiner is now working up the Dime ingots he had on hand at settlement, and we are taking care of the returned clippings, etc.; so this appears to be a convenient time to dispose of said coin by making it into Dime ingots, and I so recommend.

Respectfully,

Joseph Milburn
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

January 8, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint, Denver.

Sir:

I find the records of the three melts of copper on the platform in the upper corridor to which I called your attention this morning show that the first melt is Refinery copper and the other two General Department scrap copper, and that M. & R. Experimental No. 40 contains 99.87% copper,

"	"	"	48	"	99.75%	"
"	"	"	49	"	99.37%	"

and neither gold or silver is shown in any of them; and that the weight of metal is more than double the amount necessary to square up the recent copper deal with the junk-man.

Respectfully,

Joe Wilson

Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Supt. - 2

with melting operations.

The Refinery extraction of values was unusually good, but that of the Ingot room was only fair; however, I hope to better this condition in the future. In this connection, let me direct your attention to the unusual difficulty encountered by the Assayer in arriving at a positive determination regarding the values contained in the sweeps.

When the Refinery was not running and the Ingot room operating exclusively on silver, the present system of treating the sweeps in the sweeps cellar was probably all right and certainly economical; but with the Refinery running and the Ingot room operating on gold the present method does not appear to be sufficient, owing to the impossibility of extracting all the metallies; and the presence of the same in the Assayer's samples makes it almost impossible to get an agreement on the Assays and may also operate to our disadvantage in dealing with the smelter when selling the tailings.

Respectfully,

Joseph W. Milson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

January 22, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver.

Sir:

The copy of report on special assay silver coins from the Philadelphia mint for December, 1923, and January, 1924, is interesting, and shows good work. In this connection, may I call your attention to the report of the last Assay Commission? Its Committee on Assaying, as usual, mass-melted silver coins representing a year's work, and reported the finenesses of the mass melts, as follows:

Philadelphia, 899.1

San Francisco, 899.8

Denver, 900.0

Respectfully,

Joseph M. Wilson
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

February 6, 1924.

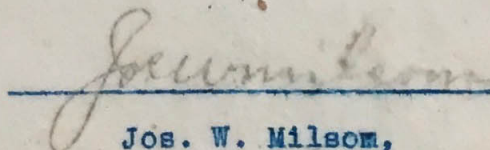
Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver.

Sir:

Yesterday, February 5th, the Refinery melting room had a melt consisting of M. & R. experimentals and Coiner's clean-up bars from the 1920 settlement. This melt was to be poured into anodes for the copper cells, and knowing it would be slow in melting it was placed in the crucible about one o'clock, as similar melts usually require two to two and a half hours' time. This melt, however, apparently contained nickel, and was so slow in coming down that the men, viz., Stoddard, Welsh, Hume, Wilcox, and Koebel, worked until five o'clock. They usually leave the building at four o'clock; last night they left at 5.12.

It seems proper that each should receive one hour overtime on yesterday's work, and I so recommend.

Respectfully,



Jos. W. Milson,
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

February 11, 1924.

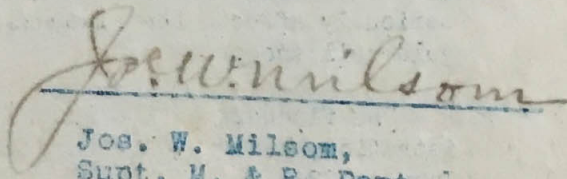
Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver.

Sir:

Answering your communication of the 5th inst., concerning the Thayer Electrochemical-Centrifugal process for treating sweeps:

If all the claims of the patentee could be substantiated in actual work, I think the process would handle our sweeps all right, but I could not fairly pass upon its merits without much additional information. Therefore it might not be advisable to pursue this inquiry any further, as we know that there are well proven amalgamating processes available nearer home, and without any royalty complications.

Respectfully,


Jos. W. Milson,
Supt. M. & R. Dept.

FS

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

February 27, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

Answering your communication of the 25th inst.:

On October 1st, 1921, I took the oath of office as Superintendent of the Melting and Refining department, and on that date was charged with all the bullion on hand, which included, with other, sixty-five melts of copper that had been delivered to the Commission in the March, 1920, settlement of this department, and which were under the seal of the Commission in Vault "G." All of these melts (with the exception of No. 51) contained small amounts of gold or silver, or both, and four of them (being melts Nos. 29, 30, 30, and 31) contained so much gold that they were reserved for treatment here; and the remaining sixty melts, gross weight, 99,727.25 ounces, were, by Mr. Grant's direction, sold to the Baltimore Copper Smelting and Rolling Company, which completely disposed of all copper in my possession which had been reported as containing any gold or silver values. Mr. Grant's action in this matter was very advantageous to the government, as the smelter paid for considerably more values than were credited to this department, to wit: We were credited with 44.477 ounces of gold and 258.52 ounces of silver; and the smelter actually paid for 65.636 ounces of gold and 337.07 ounces of silver; and in addition the smelter paid \$699.94 for the copper content, and the cost of transportation and treatment amounted to only \$292.85. However, this department received credit for all it was entitled to, which was the amount actually charged against it on this account.

And now we come to the copper sold to the City Iron and Metal Company, amounting to 4695 pounds, 727 pounds of which were returned by said company because it was not good copper and contained iron and other base metals; 360 pounds of the amount so returned was found to contain an appreciable amount of gold and silver values.

All of said copper so sold to the City Iron and Metal company that was furnished by this department came over from a previous M. & R. administration without charge, and none of it was reported as containing any gold or silver values. The only record I find relating to it is M. & R. Experimental No. 18, under date of April 22, 1921, with a notation stating it was "Minor Metal Ing. Room clean-up, 87% Cu., no gold or silver," and 1920 settlement copper melt No. 51 which does not show any copper determination, but does show that it contained neither gold or silver, and from its appearance it was cathode copper.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

I find a record, made during my incumbency, of fourteen melts of scrap copper from the General department, all of which I had regularly assayed, and they were reported as containing the following percentages of copper, respectively:

97.5 - 96.37 - 99.62 - 99.75 - 99.75 - 99.5 - 99.5 - 99.37 - 97.5
98 - 96 - 92.25 - 89.5 - 89,

and ten of them were reported as containing lead or iron or both. I have a record of the weights on the first nine of these melts, and the average weight is 3374 ounces per melt; and if this average obtained for the other five melts (which were never brought up from the lower corridor), it would make a total of 3209 pounds of scrap copper, which, with the addition of Experimental No. 18 and Settlement Melt No. 51, above referred to, would make approximately 3500 pounds of metal leaving a balance of about 1200 pounds of other copper to be accounted for in the amount sold to the City Iron and Metal Company. As to this 1200 pounds, it was refinery product and consisted of copper slabs, anodes, and cathodes; but, that any of it contained an appreciable amount of gold or silver values is difficult to understand, because the then Superintendent of this department wrote to the Mint Superintendent on February 26, 1920 (settlement was March 8, 1920, ten days later), among other things, "It looks as though we will have a loss of 242.163 ounces of gold," and in settlement he turned in to the Commission twenty-two melts of copper that did not contain any gold and only 34.72 ounces of silver; and when he was working that close to overcome a supposed wastage I cannot account for finding values in the copper sold to the City Iron and Metal Company which was then in his possession but which he did not turn over to the Settlement Commission because he must have been satisfied that it contained no gold or silver values.

All gold and silver contained in this copper had undoubtedly been charged to this department, as the copper is produced only from the refinery operations on the bullion deposits containing the gold and silver with which we are regularly charged.

Respectfully submitted,

Jos. W. Milsom

Jos. W. Milsom,
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT.

March 3, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

Supplementing my letter of February 27th, in response to your communication of March 1st, I respectfully present the following answers to your questions:

1. Melt No. 51 was included in the material sold to the City Iron and Metal Co., but Melts Nos. 29, 30, 60, and 61 were not.

2. M. & R. Experimental No. 18 and 1920 Settlement Copper Melt No. 51 (same melt as referred to in answer No. 1 above) were included in metal sold to the City Iron and Metal Co.

3. The fourteen melts of scrap copper (copper assays shown) were included in material sold to the City Iron and Metal Co.

Melts Nos. 29, 30, 60, and 61, referred to in item No. 1 of your letter, were not sold, but were reserved for treatment here, and were delivered to the Refinery for such treatment on the following dates in 1923, viz: No. 29 on Dec. 12th; No. 30 on Oct. 3d; and Nos. 60 and 61 on Oct. 8th; and all of these have been regularly used in Refinery operations.

4. The report of "surplus," as shown in this item for fiscal year 1920 of this department, agrees with the records in this office, but that is of date June 30th; and the Refinery settlement of that year was of date March 8th, and the Refinery surplus was 140.851 ounces gold and 30.84 ounces silver.

My reference in the communication of February 27th to a recorded anticipation of loss by the then Superintendent of this department was to show why I could not reasonably account for any copper containing values not being returned to the Settlement Commission, because, owing to said anticipation, he would certainly make every effort to overcome or at least reduce said anticipated loss.

5. The material sold to the City Iron and Metal Co. did not have any permanent marks of identification.

6. The record of weights that I find relate only to the settlement Copper Melt No. 51 and the first nine (9) of the scrap copper melts; and as the latter were intermingled somewhat and were of the same shape and appearance, it would have been impossible to verify the weights, nor was any effort made to do so.

Five of the scrap copper melts were in the lower corridor; copper

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

Superintendent - 2

Settlement No. 51 was in the Make-up room, and nine (9) of the scrap copper melts and all of the Refinery copper were in the second floor corridor.

My assistant, the Foreman of the Refinery, and myself went over the copper in the upper corridor and picked out several melts of good copper that we intended to reserve for possible use in the Refinery, but they were not needed for that purpose and later were used in substitution for material returned by the City Iron and Metal Co., pursuant to your request of January 21, 1924. That was the only inspection that was made. I then directed the Refinery men to take all the remaining copper material to the basement corridor, and that was the end of this department's connection with the original sale to the City Iron and Metal Co.

A little over two-thirds of the material originally sold to the City Iron and Metal Co. was general department scrap copper, and the rest consisted of old Refinery copper anodes, cathodes, and slabs that had been lying around in various places and all supposed to be valueless except as to copper content; and I cannot find any record or charge of any kind against this department in relation thereto.

7. Mr. Matson took the oath of office as Superintendent of the M. & R. Department on April 13, 1919. Mr. Bartlett never was in charge of this department, but late in 1918 became "Acting Foreman of the Refinery," and continued to act as such foreman under Mr. Matson, until after the 1919 settlement.

As to whether any of these slabs sold to the City Iron and Metal Co. were produced while Mr. Bartlett was acting foreman of the Refinery and prior to Mr. Matson's incumbency, it is impossible to determine, as there is no record of any kind relating to the matter.

In the settlement of June 30, 1919, twelve (12) copper melts were returned: three of them on June 13th, six on June 14th, and three on June 18th. Seven (7) of these melts were returned to the Refinery for treatment in September, October, November, and December, 1919; and the other five (5) in October and November, 1923.

Respectfully submitted,

Jos. W. Milsom

Jos. W. Milsom,
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,

MELTER AND REFINER'S DEPARTMENT,

March 5, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

My attention has been called to an anomalous condition existing in the compensation of Borstadt and Stoddard of the Refinery force.

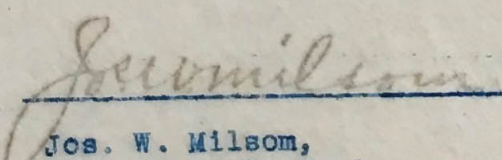
X. T. Stoddard is foreman of the melting room, and his pay is \$6.50 per day, or \$2034.50 per annum; and George J. Borstadt Jr.'s salary as foreman of the Refinery (and Stoddard's superior) is \$2000.00 per annum.

They are both splendid, competent men. Stoddard is the best foreman we have ever had in the Refinery melting room, and is surely entitled to all the pay that he is now receiving; however, the melting room work requires his services only on regular working days.

Borstadt has proven himself to be the most careful and one of the most competent foremen we have ever had in the Refinery; and as the Refinery is in constant operation he comes in on Sundays and holidays to see that everything is running properly, so that he necessarily works more hours than a per diem man. In addition, I think his position entitles him to some increase of pay over any one working under him.

I therefore earnestly recommend that Borstadt's salary be increased from \$2000.00 to \$2100.00 per annum.

Respectfully submitted,


Jos. W. Milson,
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 7, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

We shall need some stoneware supplies for the Refinery in the near future, and as we always meet with slow deliveries on these goods, I recommend that steps be taken, as soon as convenient, to purchase the following acid-proof chemical stoneware, viz:-

Three (3) straight side cylindrical jars with lip and shell handles, size 30" diameter and 20" deep, no outlet.

Six (6) same form jars, size 16" diameter and 16" deep, without lip, handles or outlet.

Eight (8) same form jars, 19" diameter and 24" deep, without lip, handles or outlet.

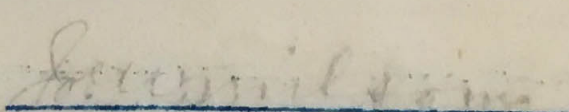
Three (3) filters, 22" long and 15" wide at top, and 20" deep, with rounded corners and tapering to 1 $\frac{3}{4}$ " less in width and length at the bottom, with heavy ledge around inside; top of ledge two inches above bottom of filter, with outlet (projecting boss about one inch) two inches in diameter at outside and tapering to 1 $\frac{1}{2}$ " inches inside, and located in the center of side of filter, and bottom of hole in outlet level with bottom of filter; together with three (3) filter plates to be used in said filters, about 1 $\frac{1}{2}$ " inches thick, and strong enough to withstand the pressure of about one thousand pounds of gold in the filter, and perforated with 3/8 inch holes, staggered, and 1 $\frac{1}{2}$ " inches between centers.

Also, three (3) filter plates (to replace broken ones from filters now in use), shaped like paper pattern hereto attached.

All jars and filters should have rims and must stand filling with hot water, and be impervious to gold chloride, silver nitrate, and strong mineral acid solutions.

All dimensions given are inside measurements.

Respectfully,


Jos. W. Milson,
Supt. M. & R. Dept.

THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

March 18, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

I herewith present in detail an estimate of the cost of recovering, by sweating, the values from Refinery Sweeps Lot No. 2, returned in settlement of December, 1923, weight 2614 pounds net:

78 sweats, 26 crucibles	at	\$7.84	\$203.84
1014 lbs. Borax	"	.17 $\frac{1}{2}$	177.45
702 " Soda	"	.049	34.40
Melting sweat kings, 3 crucibles	"	7.84	23.52
Fuel oil, 900 gals.	"	.10 $\frac{1}{2}$	94.50
Copper sulphate, 500 lbs.	"	.06 $\frac{1}{2}$	32.50
Sulphuric acid, 100 lbs.	"	.02	2.00
Electricity, 1260 K.W.H.	"	.03	37.80
Sweating copper sludge, Fuel oil & 2 crucibles			<u>21.98</u>
Supplies			627.99
One melter on sweats, 26 days at \$5.75		\$149.50	
Melting sludge & sweat kings, 7 days at 5.75		40.25	
Cell work, 6 days at 5.25		<u>31.50</u>	221.25
Total			\$849.24

Respectfully submitted,

Jos. W. Milsom
Jos. W. Milsom, Supt. M. & R. Dept.

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THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 5, 1924.

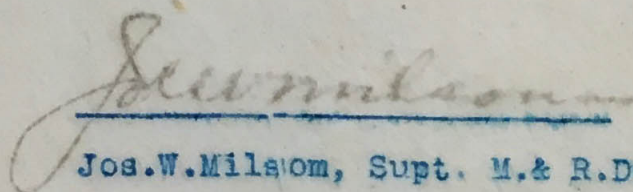
Mr. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

Requisition is hereby made for the following blank forms:

No.	No. on hand	No. required
900-1	0	25
2	0	25

Respectfully,


Jos. W. Milsom, Supt. M. & R. Dept.

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THE MINT OF THE UNITED STATES AT DENVER,
MELTER AND REFINER'S DEPARTMENT,

April 9, 1924.

Hon. Frank E. Shepard,
Superintendent U. S. Mint,
Denver, Colo.

Sir:

Answering your inquiry of this morning:

The Silver cell anode bags that we are using in the Refinery at the present time are made of $6\frac{1}{2}$ oz. drill, "No. 250," and are 24 inches by 24 inches in size. They last thirty days.

Respectfully,



Jos. W. Milson,
Supt. M. & R. Dept.

